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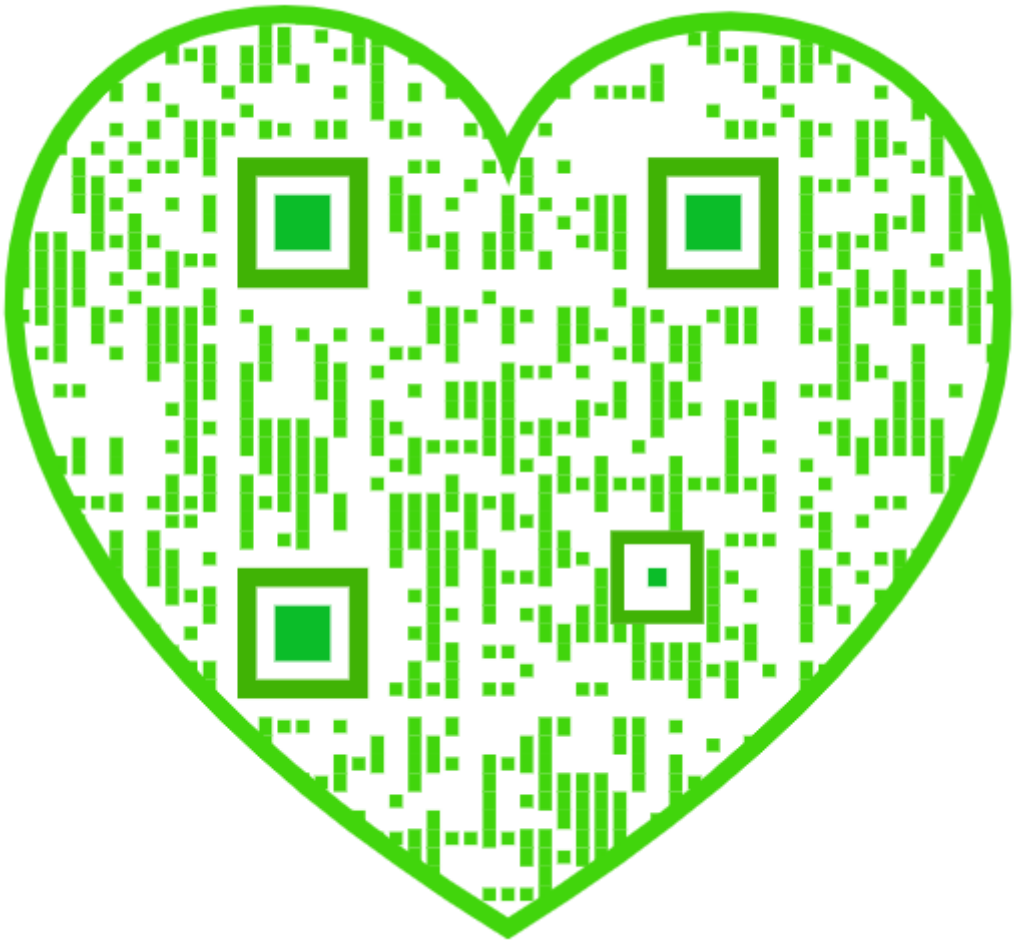
SHORT METHODS



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SHORT METHODS

A TREATISE ON

Cutting, Designing & Manufacturing

MEN'S CLOTHING

WITH COMPREHENSIVE DRAFTS OF

Coats, Vests, Overcoats, Trousers, Knickerbockers,
Knee Pants, Overalls, Jackets, Shirts, Drawers,
and Leggins; Grading Systems for each;
Practical Layouts, Factory Systems,
Time-Keeping Systems, etc., etc.

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INTRODUCTORY.

"Short Methods" is strictly a Manufacturers Book.

The drafts are especially designed for the Manufacturing Cutter, not that they are in any way deficient in fitting points or in any way unsuited for Merchant Tailors and Custom Cutters, but that they are so simple in their construction points, and therefore easily mastered by the army of young cutters that are constantly being trained up in the trade, and that they are backed up by the proportions and other information not needed by Tailors but absolutely essential to the Manufacturing Cutter.

The requirements of the Merchant Tailor and the Manufacturing Cutter are not identical. Th Merchant Tailor cuts to measure, the Manufacturer to proportion. The one sees and measures his subject, the other must provide for his requirements in the abstract, and while the Merchant Tailor has more peculiarities of form to contend with, perhaps, he is not required to exercise the same economy of time, labor, and materials, his seams are protected by basting before sewing, and he experiences none of the difficulties of make-up which must attend the manufacture of garments on a large scale.

That too small a percentage of cutters in the trade are draftsmen is well recognized. The necessary education is hard to obtain.

To those who can spare the time and means to attend the various schools of cutting, a higher rate of tuition is charged than to Merchant Tailors, while existing books on the subject omit much of the explanatory instruction so essentially necessary to the cutter who aspires to a higher education but whose experience has been limited to merely mechanical work or to the simpler class of garments.

To meet this deficiency, to place within the reach of the rank and file of Cutters a convenient means of self-instruction, by which they may acquire the technical education necessary to their own advancement and to raise the general standard of efficiency in the trade is the aim of this book.

The drafts are simple, comprehensible, perfect and correct, and are produced by the shortest method possible. Both proportions and drafts are absolutely reliable and produce perfect fitting garments.

The Factory Systems, Time-keeping Systems, Methods of Handling Work, etc., are founded on practical experience, are among the best in use today, and while intended mainly for the benefit of the inexperienced, will be found to contain many points of interest to even the seasoned veteran in the trade, and every Manufacturer, Superintendent, Cutter or Apprentice who studies the book diligently will find it worth many times its price.

THE AUTHOR.

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PART ONE.

CUTTING.

DRAFTING.

Drafting requires exactness. A pattern should never be cut in haste. Every measurement should be applied and each line drawn as though the entire pattern or set of patterns depended upon it alone. The slightest error may ruin many valuable yards of cloth.

Again, no set of patterns should be put in use until thoroughly tested: that is, one or more garments made from them to see that they make up properly. Errors are easily made but are also easily corrected if corrected in time.

The seam edges should be measured and compared to see that the garment will join up properly. On some classes of work one seam edge should be longer than the other. A seam to be joined on a Union Special Felling machine or similar machine should be from one-eighth to one-quarter inch longer on the under side than on the top to allow for the take-up of the feed. For the same reason a bias seam edge that is to be joined to a straight one should be cut from one-eighth to one-quarter inch shorter because the bias edge will stretch.

A like principle applies to the different weight fabrics. A thick corduroy requires much more allowance for make-up than a light weight serge or worsted. These should not be cut from the same pattern. There should be at least one-half inch difference between them to insure the same results. Generally, corduroys are cut on a much larger scale than the lighter weight fabrics.

Careful attention to these little points at the proper time will avoid many difficulties in regard to twisted garments and short sizes.

THE SQUARE.

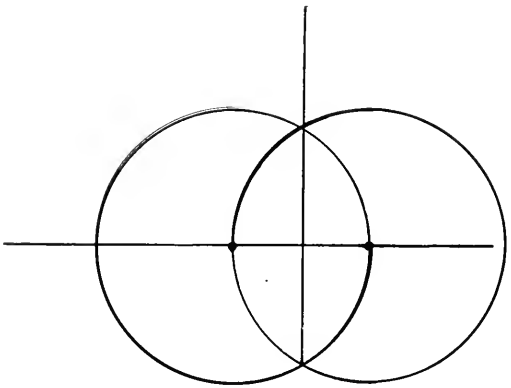
The Tailor's Square is indispensable in drafting. The average seat and breast measure ranges from 24 to 50, and these measurements are properly proportioned on the square. On the short side are given the halves, fourths, eights, sixteenths, and thirty-seconds. On the long side are divisions of two-thirds, thirds, sixths, twelfths, and twenty-fourths. These proportions are constantly used in drafting and one should thoroughly understand the use of the square to draft correctly.

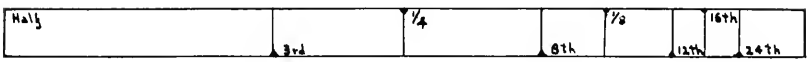
Of course in emergencies one may draft without it, but it is not advisable when it can be avoided. When necessary this is accomplished by using a scale. A strip of paper will suffice, and for 36 seat or breast should be cut 9 inches long; for 38, 9½; for 40, 10 inches, and so on.

Fold this strip in the center and notch as shown in the accompanying sketch, which gives one-fourth, fold it again and you have an eighth, fold it again and you have a sixteenth, again and you have a thirty-second. In the same manner notch the other side for thirds, sixths, twelfths and twenty-fourths. This will give a very satisfactory scale for use in the absence of a square.

For a square line as a starting point if no square is available describe two perfect circles as shown in sketch, one having its center in the circumference of the other. Draw a straight line through the intersection of the two circumferences, and the other way through the two centers and you have a square line to start from.

A tape measure should not be used for applying measures in drafting as they are too flexible and uncertain.





COATS.

The drafts as shown are made almost entirely by divisions of the breast measure and while it is doubtless the simplest system known, it is second to none in fitting points for proportionate sizes, and with proper use it is equally as good for disproportionate forms.

The measures needed therefore are only the breast measure, waist measure, length, waist length and sleeve length.

The construction lines are the same for all styles of coats, the difference being in the location of the seams, which of course is governed mainly by style, and in allowance or extra fullness.

Duck or covert coats should be drafted by one inch larger breast measure. For a 36 size, draft by 37, etc. Overcoats by 2 inches larger, 38 being used as the drafting power for a 36 size, allowing also 2½ inches for make-up instead of 2 as in the sack. In cutting duck or covert coats, overall jackets, etc., to be joined on a two needle felling machine, the overlapping parts, such as the shoulder seam and side seam of the fore part should be cut a trifle shorter than the same seams in the back. Lined coverts should be cut the same as overcoats. It will be observed that some difference is made in the method of drafting between the large or fat men's sizes and the regular, and between the boys' sizes and the regular.

This is necessarily so in all systems because of the differences in proportion. Boys require a greater front shoulder height than adults, hence the height of the front shoulder point must be increased as the breast sizes decrease. The method of obtaining the proportionate increase required as explained under the caption of Boys' Sacks will be found simple and accurate.

By the same principle the depth of seye or the back height from the breast line to the collar is relatively less for large fat men than in the regular, and must be provided for in every system.

The provisions made for these differences in this system will not only be found simple and practical, but as accurate as the best.

The allowance for lap at the front is for single breasted sacks, 1½ inches; boys' single breasted, 1 inch; double breasted sacks, 3 to 4 inches, according to style.

For single breasted overcoats to button through 1½ inches.

For fly-front overcoats, 2¼ inches.

For double breasted overcoats, 3½ to 4 inches, according to style.

THE SYSTEM.

The strong features of this system are simplicity and accuracy. In most systems the methods of providing for the graduate increase in the heighth of back, and the location of the front shoulder point are complicated, requiring considerable deviation from the regular system for obtaining these points for the sizes above 42 and below 32.

That some difference is necessary is obvious, for boys during the years of physical development require a higher front shoulder or a relatively less back height, and by the same rule short, thick men or corpulent forms require proportionately higher shoulder points than is necessary for the regular forms.

The method of providing for the decrease in back height and increase in front shoulder height in this system will be found both simple and accurate. The back height is regulated in the following manner:

A is the starting point in the draft, and the breast line "D" is ½ breast (on division) below A for all sizes.

Now for the back height place the square with point 16 on scale of 12ths at A and mark on the scale at the figures corresponding with the breast size. If the breast size is 40, mark at 20; if breast size is 44, mark at 22; if the breast size is 24, mark at 12, etc. The point thus obtained will be the top of back (B), or the top construction line. For all sizes above 32 breast this point (B) will be below A. For all sizes below 32 breast this point (B) will be above A. In other words A is the top of back for 32 breast, and all sizes above 32 come below A, while all sizes under 32 come above A.

Bear in mind that for all sizes the breast line is ½ breast (on division) from A, not from B.

HEIGHT OF FRONT SHOULDER.

As has been stated, there is some difference in the height of the front shoulder point between the boys' sizes (below 32) and the regular sizes, and between the large sizes (above 42), and the regular sizes (32 to 42 breast).

This is provided for in the following manner:

Line B is the top construction line and gives the correct front shoulder height for all sizes from 32 to 42 breast measure inclusive.

Large Sizes: 42 Breast up—For the large sizes go up from B 1 inch to the star, and square across. Star to 2 is 18¼ inches for all sizes. 2 diagonally down to 3 is 2 inches. Draw a line from 3 up through 2. This gives a graduate line for the increase in shoulder height, which is obtained in the usual manner by squaring up from the point on the breast line.

Boys' Sizes: 24 to 32—B to the star is 1 inch, the same as for large sizes. Square across from the star 10¼ inches to 2. 2 to 3 is 3½ inches (diagonally). Draw a line from 2 to 3. This forms a graduate line for the increase of shoulder height, the shoulder point on this line being determined by the intersection of the line squared up from the breast line.

THE FRAME WORK.

THE FRAME WORK.

The plate shows the frame work for the three drafts, regular sizes, corpulent sizes, and boys' sizes.

Diagram 1 is for a 36 breast.

Diagram 2 for a 48 breast.

Diagram 3 for a 24 breast.

DIAGRAM 1.

Draw the construction line A-E (E is at the waist line).

Place the square with point 16 on the scale of 12ths at A, and mark at 18 on same scale for point B, this being a 36 size.

A to D is ½ breast (on division).

C is half way from B to D.

B to E is natural waist, 17 inches (or ¼ height).

Square lines B, C, D and E.

D to G is 1-3 breast. G to H is 1¼ inches, for all sizes below 42.

H to I is ¼ breast plus ¼ inch.

I to J is ⅛ breast plus ¼ inch.

D to K is ½ of full breast, 18 inches.

K to L is 2 inches.

L to M is 1½ inches.

Square down from G and up from H, I and J. This establishes P and S.

D to N is ⅛ breast.

Place the angle of the square at B with the long arm resting on N and square out from A to O ⅛ breast plus ½ inch.

H to R and P to Q is 1½ inches.

Square out from Q and R ⅜ to ½ inch.

S to U is ⅛ breast.

Square out from U ¼ breast to V.

Square down from M.

M to W is 2-3 breast. W to X is 1 inch.

The line M-X is for the run of the front.

E to 8 is ½ inch. 3 to 4 is 1¾ inch.

DIAGRAM 2

Draw the line A-D.

Place the square with point 16 on scale of 12ths at A, and mark at 24 on same scale for point B, this being a 48 size.

A to D is ½ breast (on division).

C is half way between B and D.

Square across from B, C, and D.

D to G is 1-3 breast. G to H is 1⅛ inches, for all sizes above 42 breast.

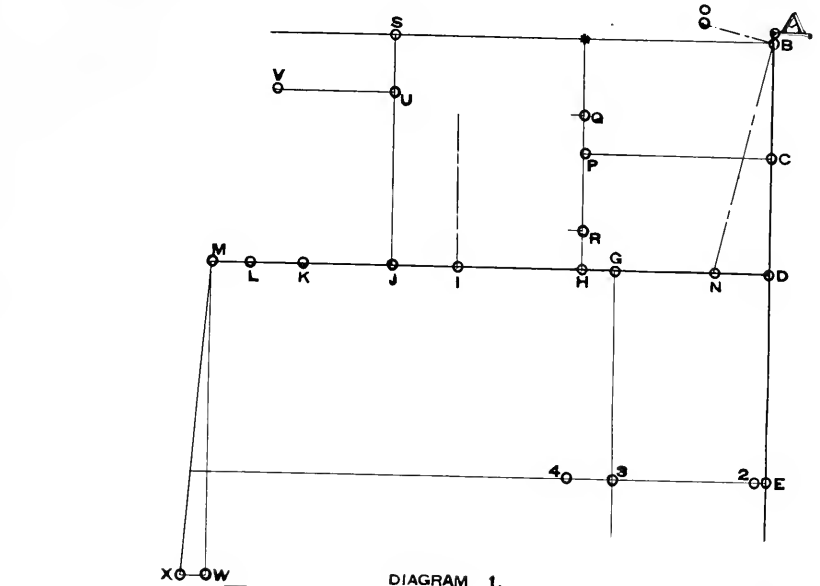


DIAGRAM 1.

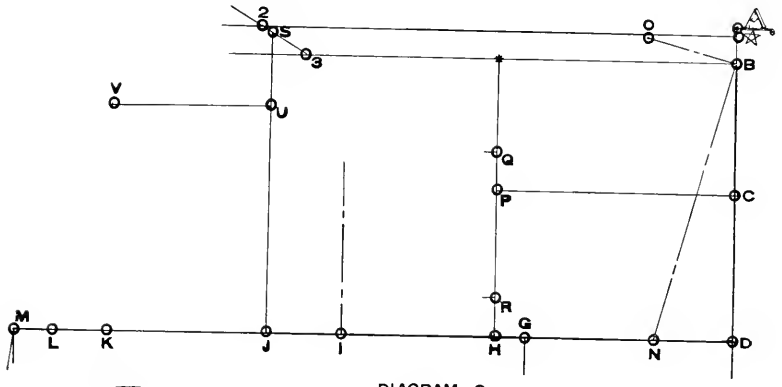
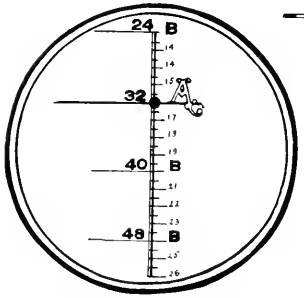


DIAGRAM 2.



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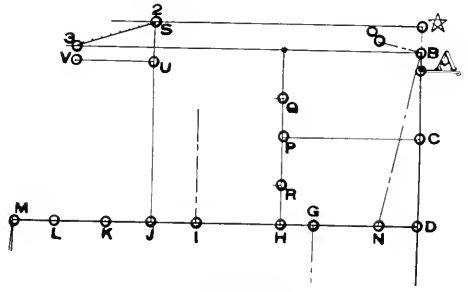


DIAGRAM 3.

Diagrams 1-2-3-4.

The next two measurements must also be reduced on large sizes and should be reduced 1-16th inch for each size above 42 breast.

The measurement for 42 breast for these points is:

For front of seye—¼ breast plus ¼ inch.

For front shoulder—⅛ breast plus ¼ inch.

Above 42 breast these measurements should be:

	Front of Seye.	Front of Shoulder.
44 Breast	¼ Breast plus ⅛ inch.	⅛ Breast plus ⅛ inch.
46 Breast	¼ Breast only.	⅛ Breast only.
48 Breast	¼ Breast less ⅛ inch.	⅛ Breast less ⅛ inch.
50 Breast	¼ Breast less ¼ inch.	⅛ Breast less ¼ inch.
52 Breast	¼ Breast less ⅜ inch.	⅛ Breast less ⅜ inch.

For this draft therefore H to I is ¼ breast less ⅛ inch, and I to J is ⅛ breast less ⅛ inch.

Square down from G, and up from H, I and J.

D to K is is ½ breast.

K to L is 2 inches.

L to M is 1½ inches. Square down from M.

D to N is ⅛ breast.

Place the angle of the square at B and square up to O ⅛ breast plus ½ inch.

We now come to the difference in front shoulder height, which is obtained in the following manner:

B up to the star is 1 inch. Square across from the star.

From the star to 2 is 18¼ inches for all sizes above 42.

2 to 3 diagonally is 2 inches.

Draw a line from 3 up through 2.

The point at which this line crosses the line squared up from J forms the front shoulder point S.

S to V is ⅛ breast.

Square forward from U ¼ breast to V.

DIAGRAM 3.

Draw the construction line A-D.

Place the square with point 16 on scale of 12ths at A and mark at 12 on same scale for point B, this being a 24 size.

Note—It will be observed that point B for this size is considerably above A, while for the 48 size it is very much below A. The breast line, however, is always located ½ breast below A.

A to D is ½ breast.

C is half way between B and D.

Square across from B, C, and D.

D to G is 1-3 breast. G to H is 1¼ inches.

H to I is ¼ breast plus ¼ inch.

I to J is ⅛ breast plus ¼ inch.

Square down from G and up from H, I, and J.

D to K is one-half of full breast.

K to L is 2 inches.

L to M is 1½ inches. Square down from M.

D to N is ⅛ breast.

Place the angle of the square at B and square up to O ⅛ breast plus ½ inch.

For the difference in front shoulder height we proceed as follows:

B to the star is 1 inch. Square across from the star the same as for large sizes.

From the star to 2 is 10¼ inches for all sizes below 32 breast.

2 to 3 is 3½ inches (diagonally).

Draw a line from 3 to 2.

The shoulder point S is located on this line at the intersection of the line squared up from J.

S to U is ⅛ breast.

Square out from U ¼ breast to V.

By the line 2-3 it will be observed that the front shoulder height increases as the breast size decreases. Point 3 is the shoulder point for a 32 breast. Point 2 for a 24 breast.

DIAGRAM 4.

Diagram 4 is intended merely to emphasize the relative positions of points A and B for the different sizes.

The heavy double line represents the construction line upon which are delineated the various points as indicated on the scale of 12ths on the square.

A forms the top of back or top construction line for a 32 breast, but for all other sizes A is simply the starting point in the draft and the top construction line B is above A for all sizes below 32 breast, and below A for all sizes above 32 breast.

PROPORTIONS.

In this system almost all measurements are provided for by divisions of of the breast measure, hence the only measurements needed, are the breast measure, the waist measure, the length and sleeve length, and as these are all explained in the grading system no table of proportion is given for coats.

SACK COATS—SIZES 32 TO 42.

DIAGRAM 5.

Diagram 5 is for a sack coat, either single or double breasted.

The size for this draft is 36 breast, length 31.

To Draft:

Draw the construction line A-F.

Place the square with point 16 at A and mark at 18 for top of back line B.

A to D is ½ breast. C is half way between B and D.

B to E is natural waist, 17 inches.

B to F is full length, 31 inches.

Square lines B, C, D, E, and F.

B to G is 1-3 Breast. G to H is 1¼ inches.

H to I is ¼ breast plus ¼ inch.

I to J is ⅛ breast plus ¼ inch.

Square down from G and up from H, I and J.

B to K is one half full breast, K to L is 2 inches, and L to M is 1½ inches. Square down from M.

D to N is ⅛ breast.

Square out from B by N ⅛ breast plus ½ inch.

H to R and P to Q is 1½ inches.

Square out from R and Q ½ inch and draw a line from O to Q.

E to 2 is ½ inch. Shape the back as represented.

Draw a line from S to Q, and make S to T the same as O to Q.

S to U is ⅛ breast. Square forward from U.

U to V is ¼ breast.

Shape the gorge from S to V.

M to W is 2-3 breast and W to X is 1 inch.

Draw a line from M through W for the front line.

V to Y is the same as L to M or 1½ inches.

Shape the front and finish.

For the under arm cut Z is half way between H and I and point 1 is 1 inch from *.

Draw a line from 1 through Z and take out ½ inch for the under arm cut at the waist line.

If the under arm cut is omitted reduce the forepart at point 12 one-half inch as shown by the dotted line.

The buttons are placed on line V, L, 5, as indicated.

For a military jacket the under arm cut may be extended to the bottom following the same line.

The suppression at the waist from 3 to 4 is 1¾ inches.

For the pockets point 6 is 1-12 breast from J.

Square down from 6 to 7.

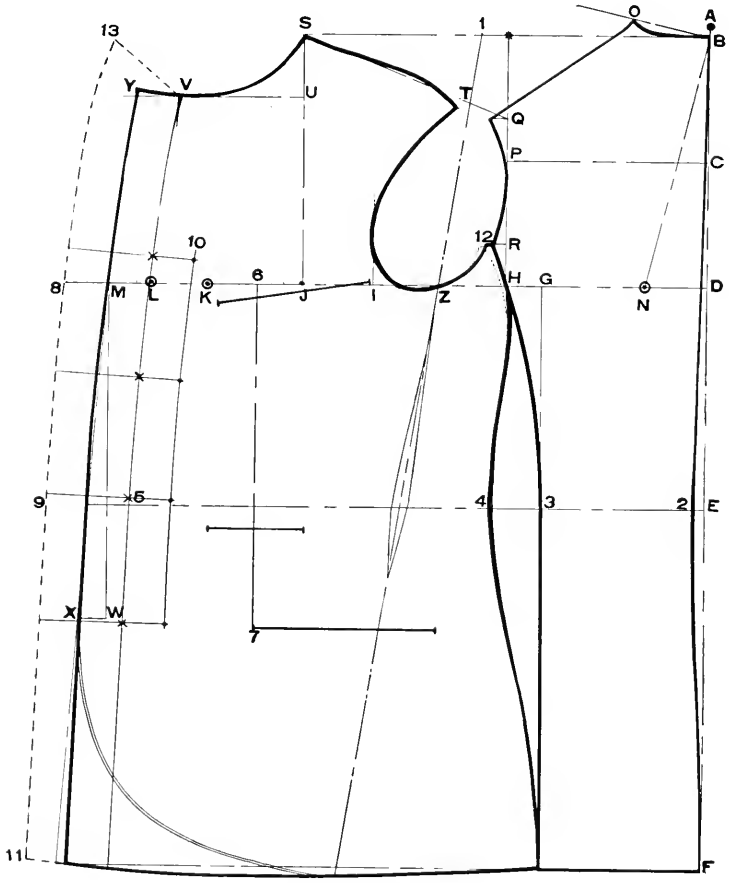


Diagram 5.

The lower pocket is usually 8½ to 9 inches from the bottom, the ticket pocket 3½ inches above it, with the upper pocket just below the breast line.

DOUBLE BREASTED SACK.

The front line for the double breasted sack is shown by the dotted line V, 13, 8, 9, 11—otherwise the draft is the same.

For this style point L to 8 is 5 inches more or less according to style; squaring down from 8 to W and thence to X by the same method as from M in the draft proper.

The lapel at point 13 may be made any width desired, but for this draft is 2½ inches.

The buttons are placed on line 10, four and one-half inches from the edge or 1½ times the distance from L to 8.

VARIATIONS.

The following diagrams, 6 and 7, give the variations necessary for large or corpulent forms (above 42 breast), and for boys sizes (below 32 breast).

As there is no difference in the draft below the breast line, only that portion of the draft above the breast line is shown, and all points below the breast line are obtained as shown in diagram 5.

LARGE OR CORPULENT FORMS—SIZES ABOVE 42 BREAST.

DIAGRAM 6.

The size used for this draft is a 44 breast.

Draw the construction line A-D, the diagram merely showing that portion of the draft from the breast line up. All points below the breast line are obtained the same as in diagram 5.

With point 16 (scale of 12ths) at A mark at 22 for top of back B.

C is half way between B and D.

Square is half way between B and D.

Square lines B, C, and D. Also E and F, as in diagram 5.

D to G is 1-3 breast. G to H is 1⅛ inches.

H to I is ¼ breast plus ⅛ inch.

I to J is ⅛ breast plus ⅛ inch.

Square down from G and up from H, I, and J.

D to K is one-half full breast, 22 inches.

K to L is 2 inches and L to M is 1½ inches.

Square down from M.

D to N is ⅛ breast.

Square out from B by N ⅛ breast plus ½ inch to O.

H to R and P to Q is 1½ inches.

Square out from R and Q ½ inch.

From B up to the star is 1 inch. Square across from the star.

From the star to 2 is 18¼ inches.

2 to 3 diagonally is 2 inches. The intersection of this line with the line squared up from J establishes the shoulder point S.

S to U is ⅛ breast.

Square forward to V. U to V is ¼ breast.

Finish as represented, obtaining all points below the breast line the same as in diagram 5.

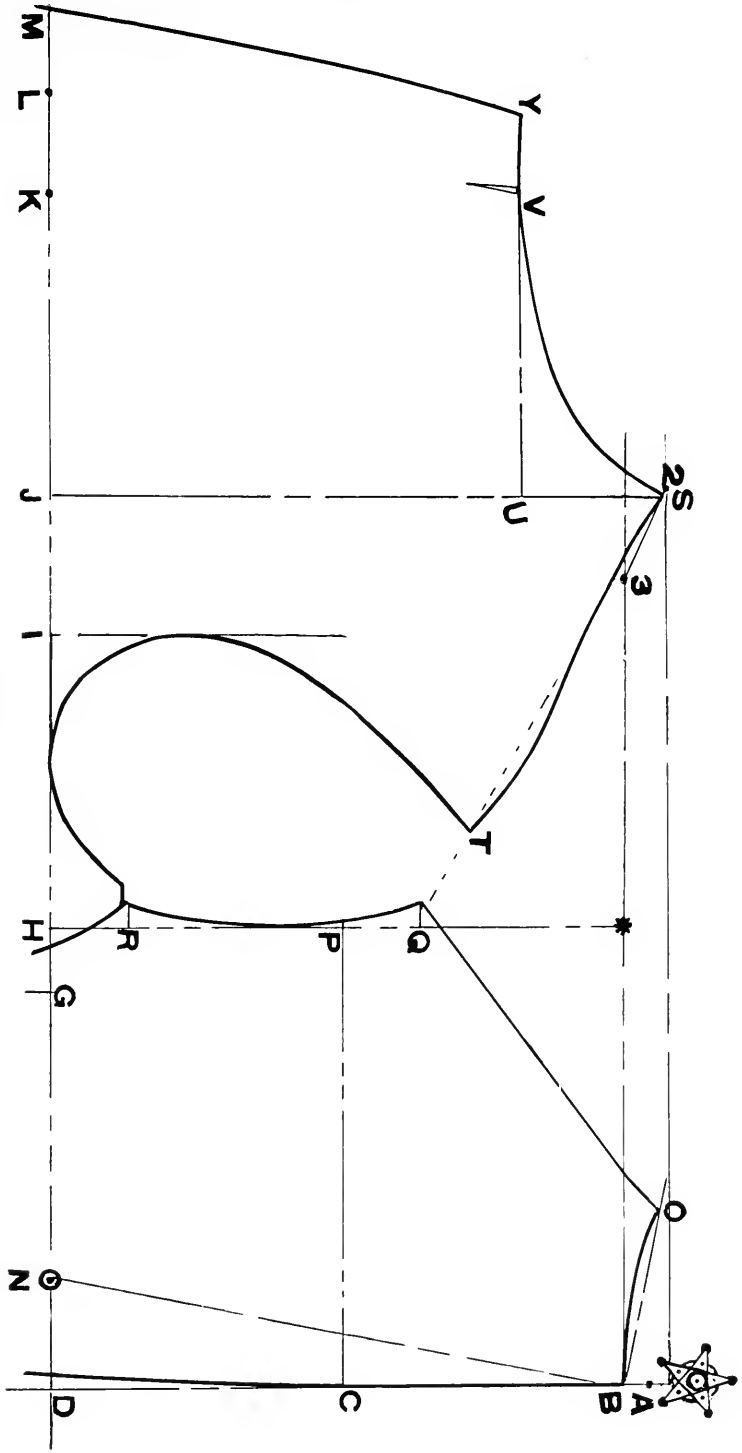


Diagram 6.

BOYS' SACKS—SIZES 24 to 32 BREAST.

DIAGRAM 7.

The size for for this draft is 26 breast.

Draw the construction line A-D.

With point 16 (scale of 12ths) at A mark at 13 for top construction line B.

A to D is ½ breast.

C is half way between B and D.

Square lines B, C, and D. Also E and F, as in diagram 5.

D to G is 1-3 breast. G to H is 1¼ inches.

H to I is ¼ breast plus ¼ inch.

I to J is ⅛ breast plus ¼ inch.

Square down from G and up from H, I, and J.

D to K is ½ full breast, K to L is 2 inches and L to M is 1½ inches.

Some prefer to make the button stand for boys only 1 inch, in which case make K to L 2½ inches and L to M 1 inch.

Square down from M.

D to N is ⅛ breast.

Square out from B by N ⅛ breast plus ½ inch to O.

H to R and P to Q is 1½ inches. Draw line from O to Q.

B to the star is 1 inch. Square out from the star.

From the star to 2 is 10¼ inches.

2 to 3 diagonally is 3½ inches. Draw a line from 2 to 3. The intersection of this line with the line squared up from J establishes the shoulder point S.

S to V is ⅛ breast. Square forward to V.

U to V is ¼ breast.

All other points are obtained the same as in diagram 5.

Finish as represented.

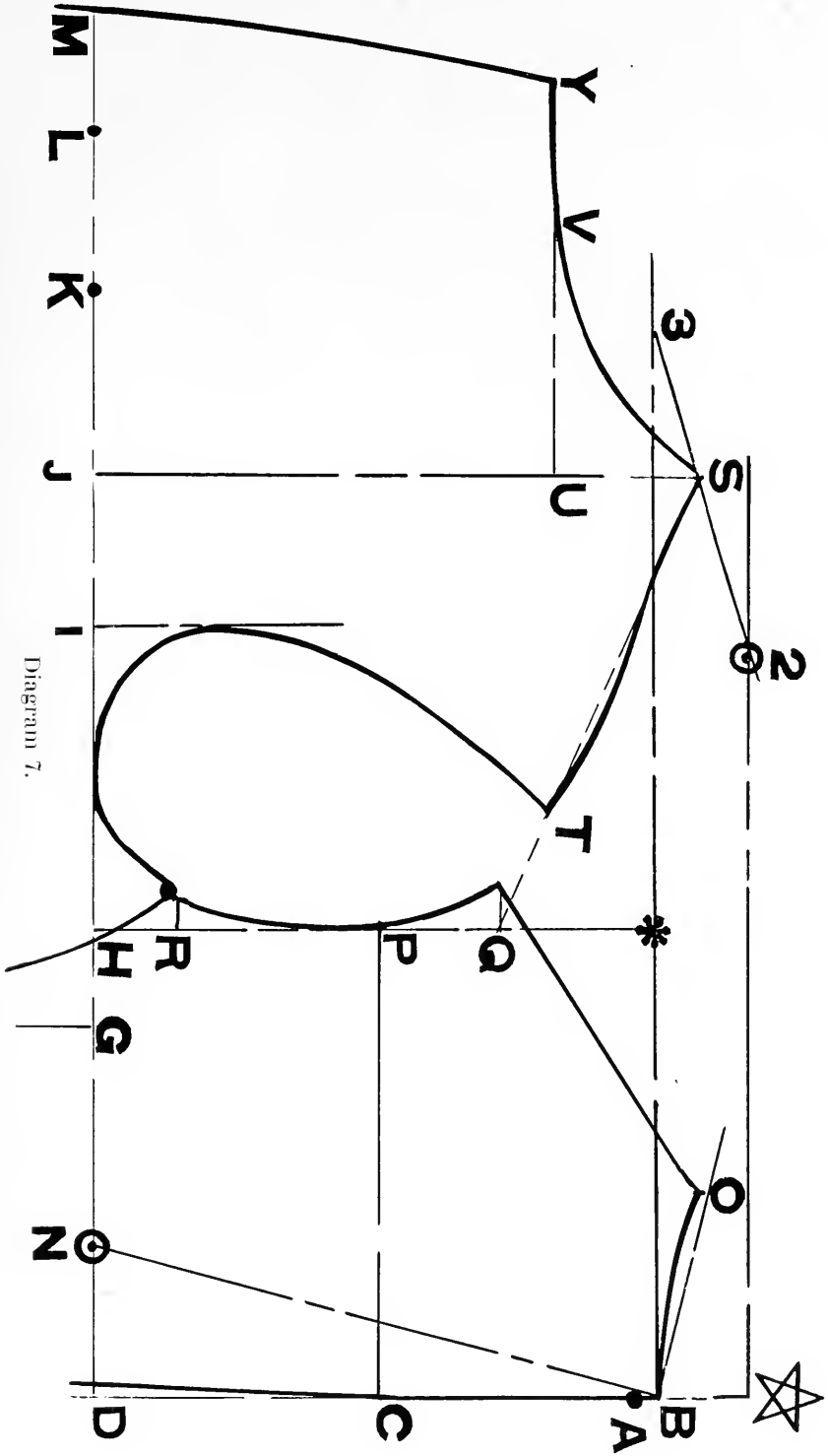


Diagram 7.

THE OVERCOAT.

DIAGRAM 8.

The draft is the same as for the under sack except that 2 inches is added to the breast measure for drafting power, and 2½ inches allowed for seams (from K to L) instead of 2 inches, as in the under sack.

This draft being for a 36 size, we draft by 38.

Draw the construction line A-F.

With point 16 (scale of 12ths) at A mark at 19 for the top construction line B.

A to D is ½ breast.

C is half way between B and D.

B to E is natural waist, 17 inches, and B to F is full length, 40 inches.

Square lines B, C, D, E, and F.

D to G is 1-3 breast. G to H is 1¼ inches.

H to I is ¼ breast plus ¼ inch.

I to J is ⅛ breast plus ¼ inch.

Square down from G and up from H, I, and J.

D to K is one-half breast, K to L is 2½ inches, and L to M is 1½ inches. Square down from M.

D to N is ⅛ breast.

Square out from A by N ⅛ breast plus ½ inch to O.

H to R and P to Q is 1½ inches. Draw a line from O to Q.

E to 2 is ½ inch.

Shape the back as represented.

Draw a line from S to Q and make S to T the same as O to Q.

S to U is ⅛ breast. Square forward from U.

U to V is ¼ breast.

Shape the gorge from S to V.

M to W is 2-3 breast and W to X is 1 inch.

Draw a line from M through X for the front line.

V to Y is the same as L to M or 1½ inches.

The under arm cut is located the same as in diagram 5 for the under sack.

Finish as represented, making 3 to 4, 1¾ inches.

For the pockets, 6 is 1-12 breast from J.

Square down from 6.

7 is ¼ breast below the waist line.

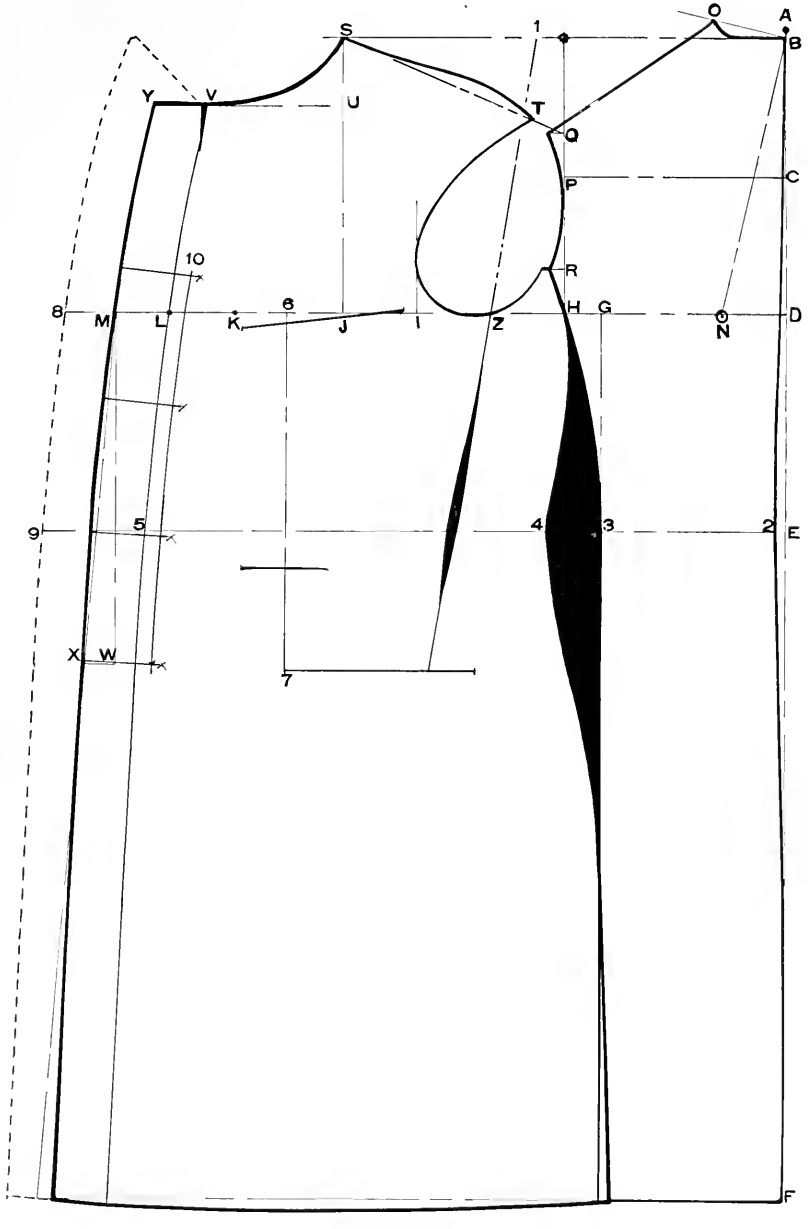


Diagram 8.

THE SLEEVE.

DIAGRAM 9.

This is a combination diagram representing three different styles of sleeves:

1. The ordinary two piece sleeve.
2. The two piece sleeve with the narrow under arm piece.
3. The one piece sleeve.

The sleeve is drafted by the size of the scye.

Measure the armhole carefully from T to Q, deduct ½ inch and the balance, which for this draft is 18, is the working power.

Square lines A-C and A-D.

A to B is 1-6 scye plus 7-8 inch.

A to C is the length, 24 inches.

A to D is ½ scye (for this draft 9 inches or 18 on halves).

Square out from B and C and down from D.

This establishes E and F.

B to G is 1-6 scye plus ½ inch.

D to J is ⅛ scye.

Sweep from A pivoting at G.

Shape the top of the outside sleeve touching the top of sweep and curving downward through J to E.

F to L is 1¼ inch.

L to K is the width at wrist or 6¼ inches.

Shape the remainder of the outside sleeve from A to K and L to F rounding out at elbow ½ to 1 inch and hollowing the inseam from E to L the same amount.

A to I is 1¾ inches.

E to H is ½ inch. Square out from H.

Shape the under arm sleeve as represented, touching the H line about 1½ inches from E.

For the Narrow Under Arm Piece:

Square each way from H and extend the line C-F.

H to 1 and H to 2 is 1 inch.

F to 3 and F to 4 is 1 inch.

Draw a line from 1 to 3 and 2 to 4.

The inseam line of the under arm piece is represented by the light double line 1-Z.

That of the outside sleeve by the paneled line 2-Z.

THE ONE PIECE SLEEVE.

All points are obtained in the usual way and the lines laid the same as for the ordinary two piece sleeve except that the curved line E-X-L is omitted and the paper is folded on the straight line D-F.

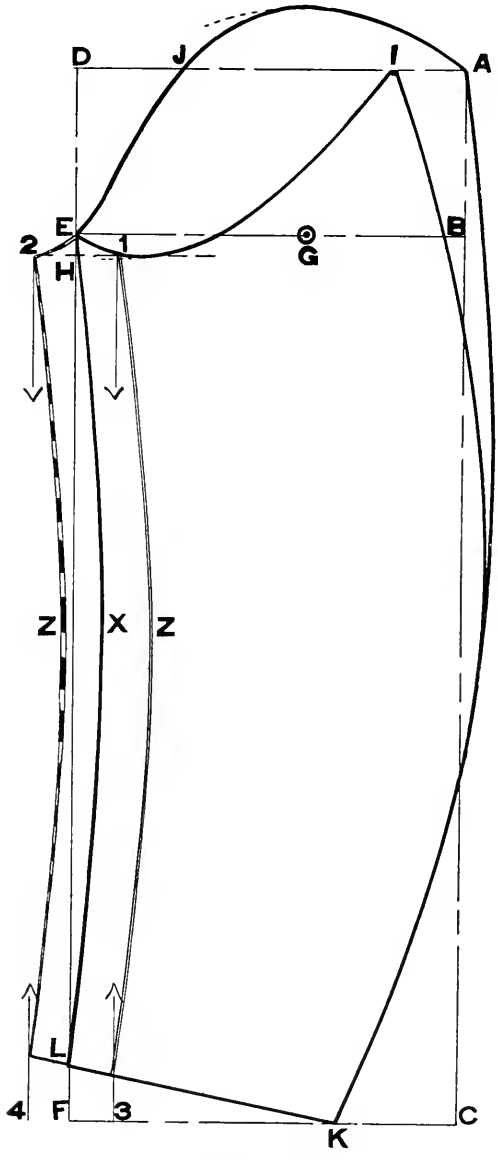


Diagram 9.

THE AUTOMOBILE COAT.

DIAGRAM 10.

Automobile Coats are being included in the lines of many up-to-date manufacturers, and as they are made from diverse fabrics their manufacture is not confined to the regular suit houses alone.

Especially is this true of coats for summer wear and early fall and spring, as they are made from Khaki and similar fabrics.

The coat shown in the accompanying diagram, however, is one of the latest designs, and is made chiefly from a heavy woolen fabric known as Irish fleece, with raglan sleeves, and very loose, and the sleeves rather large.

The depth of seye for this coat is made full ½ breast from top of back line.

To Draft:

Square lines A-F and A-U.

A to B is ½ breast; to C ¼ breast; to D ⅛ breast; to E is natural waist, 17 inches; to F is full length, 40 inches.

Square lines B, C, D, E, and F.

B to G is 1-3 breast plus 1¼ inches.

B to H is one-half breast (on division).

B to I is 2-3 breast.

Square up from G and I and up and down from H.

B to N is ⅛ breast.

With the angle of the square at A and the arm on N square back from A and make A to O ⅛ breast plus ½ inch.

Draw a line from O to P.

F to 4 is 1 inch.

Draw a line from A to 4 for center of back.

The line A-4 goes to the fold of the cloth. If a seam is desired in the back it must be added.

* to S is ¼ breast, and S to T is 1 inch.

T to U is ¼ breast. Square down from U.

U to V is ⅛ breast.

Shape the gorge from T to V.

O to Q is the same as S to R.

I to 8 is 1 inch.

J is half way between G and I.

J down to 9 is 1 inch.

Shape the back as represented and shape the seye from H to S.

B to K is one-half of full breast. K to L is 3 inches, and L to M is 2 inches. Square down from M.

M to W is 2-3 breast. W to X is 1 inch.

Draw a line from M through X to the bottom.

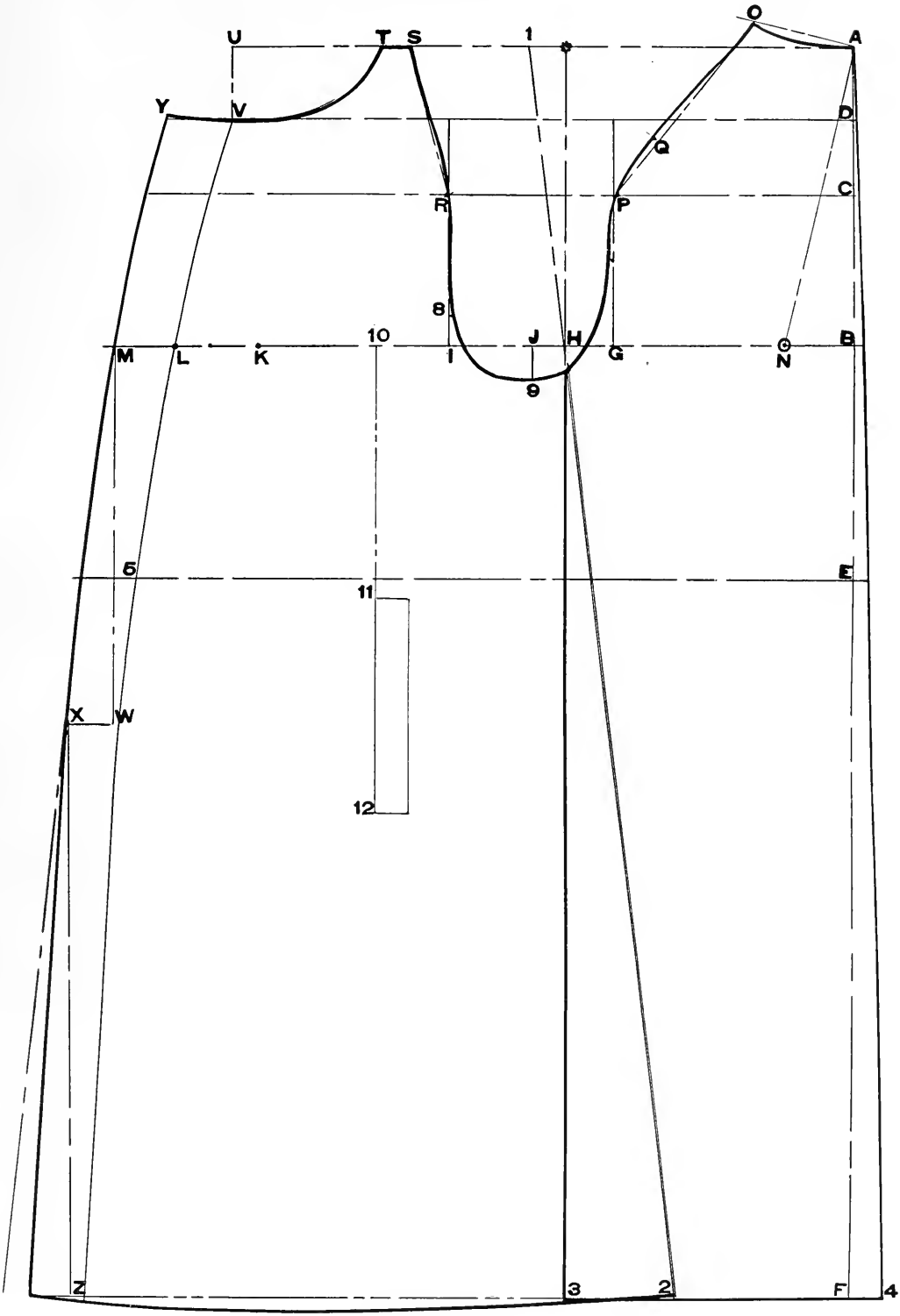


Diagram 10.

Square down from X. The run of the front is midway between these two lines.

* to point 1 is 1¼ inches.

Draw a line from 1 through H for the side seam of the forepart and make H to 2 the same as H to 3.

Finish as represented.

The coat is made to button through and the buttons are placed on the line V, L-5.

1 to 10 is ⅛ breast. Square down from 10.

10 to 11 is 8 inches and 11 to 12 is 7 inches.

The pocket may be made as an opening for access to the trouser pockets or with a patch pocket inside.

The collar is drafted as shown in diagram 15, page 33.

For diagram of sleeve see next page.

THE SLEEVE.

DIAGRAM 11.

The sleeve is a raglan but like the coat is cut very large, and may be finished in the ordinary way with a strap to button over at the wrist, or cut with a wrist band and the sleeve pleated in on the wrist band, the wrist band being small and close fitting, thus obviating the necessity for wind shields.

The draft is made by twice the distance from 8 to P, which is half the seye measure.

For this draft the seye is 23 inches.

Square out and down from A.

A to B is 1-3 seye plus 7-8 inch. A to C is the length.

D is half way between B and C.

A to E is ½ seye (23 on halves).

Square out from B, C and D, and down from E.

This establishes F, H and I.

B to G is the same as A to B. Square up from G.

F to J is ⅞ inch.

G to K is 1-6 seye, and K to L is the same as O to Q in the coat draft.

H to M is 1¼ inches. M to N is 7½ inches.

E to O is 1-12 seye.

I to P is 1-3 seye, and P to Q is 1-6 seye less ¼ inch.

A to R is 2¼ inches.

Take the back part of the coat, place the shoulder seam so that point O touches at L and P at A and mark along the shoulder seam of the back.

Place the forepart so that point S touches at L and the shoulder seam touching at O and mark along the shoulder seam of the front from L to F.

Finish as represented.

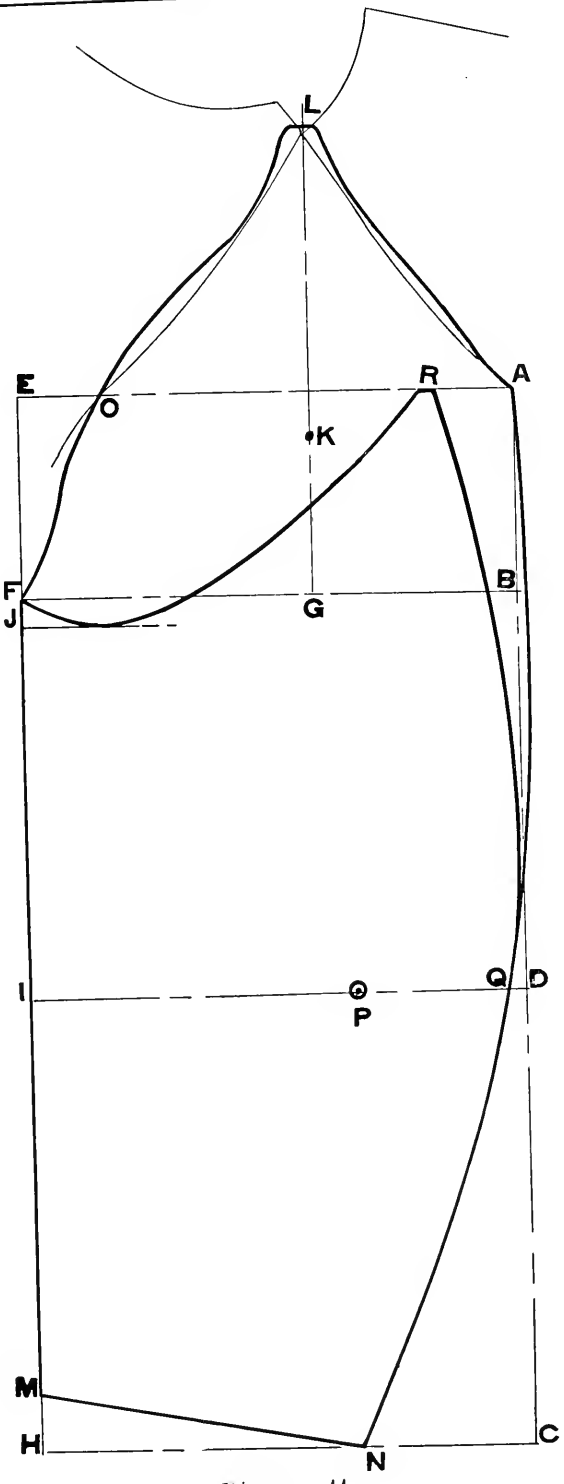


Diagram 11.

A PAGE OF COLLARS.

On the opposite page are designs of various shapes in collars.

DIAGRAM 12.

For Double Breasted Sack—For the ordinary roll draw a straight line for the break of the forepart, from the end of the roll B to a point ¼ inch in advance of the shoulder point, and from A where this line crosses the gorge through a point ¼ inch back of the shoulder point. 1 to 2 is 1⅛ inches and 2 to 3 is 1½ inches more or less according to style. Finish as represented.

DIAGRAM 13.

For a Single Breasted Coat—Same as above.

DIAGRAM 14.

Half Prussian Collar—For roll or closed fronts.

Draw the break line as for Diagram 12.

Curve the crease line from V through or near the shoulder point and the seam edge to correspond. Make the widths from 1 to 2 and 1 to 3 the same as Diagram 12.

DIAGRAM 15.

Prussian—Curve from A through the shoulder point for the crease line. 1 to 2 is 1¼ to 1⅜ inch. 2 to 3 is any width desired. Curve the seam edge to correspond with the crease line.

Used principally for overcoats.

DIAGRAM 16.

Military Collar—Make the edge straight from A to 1.

Width 1⅛ to 1⅜ according to taste.

DIAGRAM 17.

Draft same as 14 except that the width at back is 3½ inches and at lapel 2¼ inches.

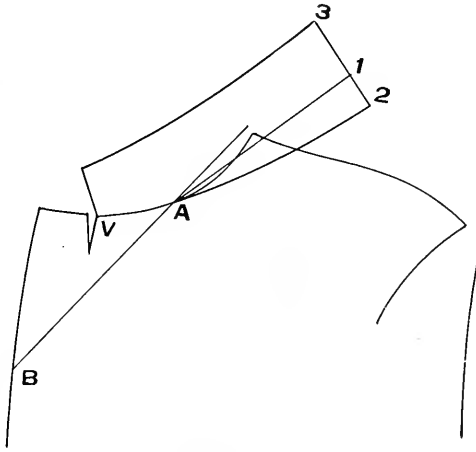


Diagram 13.

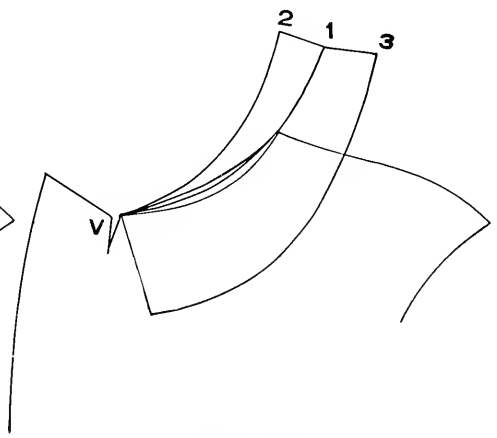


Diagram 15.

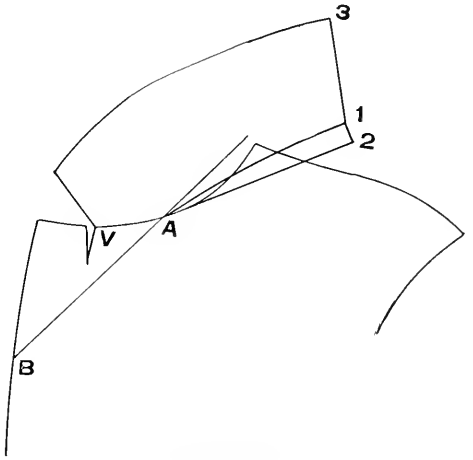


Diagram 17.

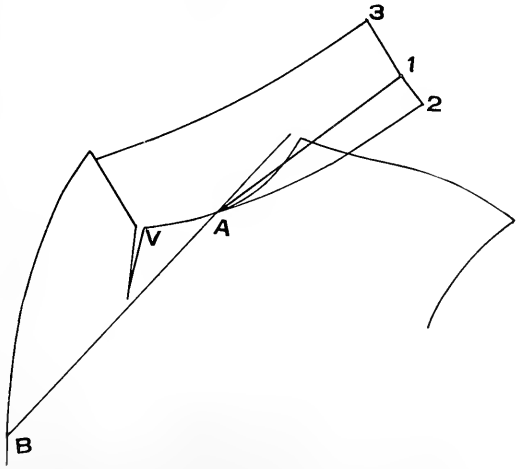


Diagram 12.

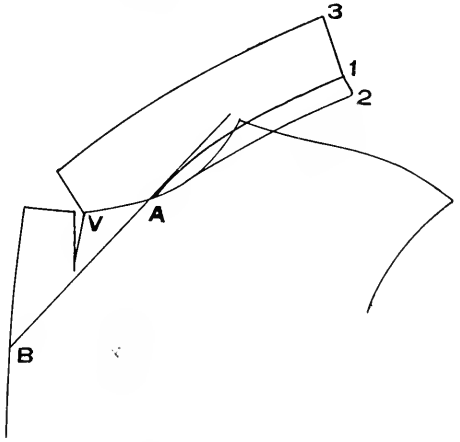


Diagram 14.

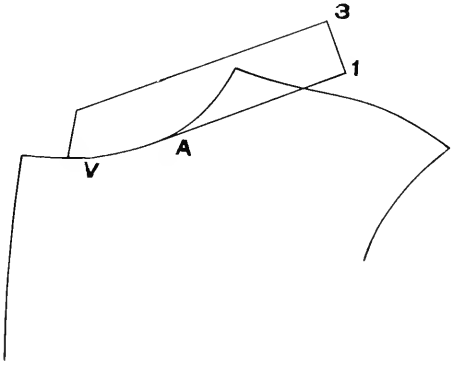


Diagram 16.

THE VEST.

DIAGRAM 18.

The draft is produced from the following measures:

Breast 36, waist 32, opening 12, front length 25, back length 18½.

Square lines A-E and A-M.

A to B is ½ breast plus 1¼ inches.

A to C is 1-6 breast plus 1¼ inches.

A to D is natural waist, 17 inches.

A to E is full length or back length.

F is half way between D and E.

Square lines B, C, and D.

B to K is ½ breast plus 2 inches (20 inches).

H is half way between B and K.

H to G and H to I is 1-6 breast.

K to J is ⅛ breast.

Square down from H and up from G, I, and J, establishing L. M, and N.

A to R is 1-6 breast and R to S is ½ inch.

L to U is ½ inch. Draw a line from S to U.

M to T is ⅛ breast. Draw a line from T to L and make T to V the same as S to U.

Square down from K and draw a line from M to K. Apply the opening length from A to S thence from T to W plus ¾ inch, continuing the front length down to P, adding 1 inch.

Draw a line from T to W and from P to F.

P to Q is 2 inches, and Q to X is 1½ inches.

D to I is 1 inch, I to Z is ½ waist plus 1 inch, and O to Y is the same.

Finish as represented, extending the collar above T the distance from A to S.

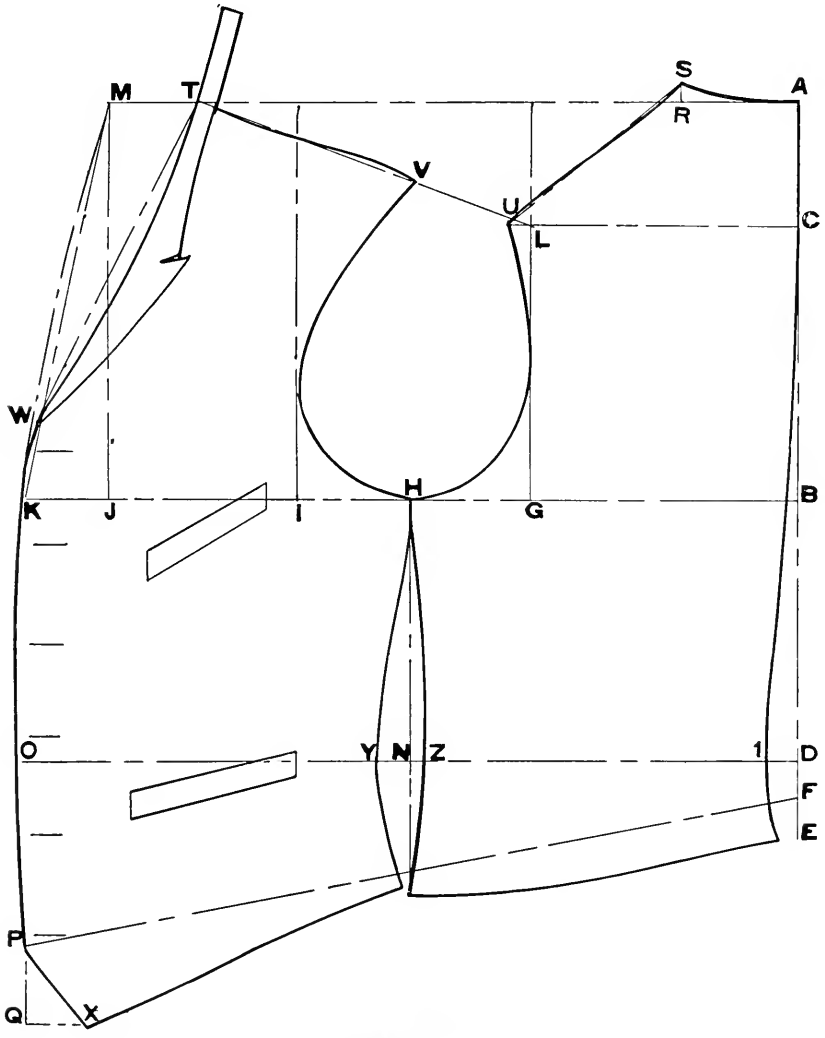


Diagram 18.

TROUSERS.

The accompanying schedule of proportions for trousers will be found suitable for ordinary work.

For all sizes above 32, the depth of waist or rise is for a 32 length. For long lengths this should be increased, for as the height increases, the depth of waist should be increased.

The measurements as given are for ordinary straight leg trousers, and of course can and should be altered to suit the style.

Peg tops or hip trousers should be cut somewhat shorter. How much, depends entirely on the style, but makers of cheap or medium prices will find it better to follow moderate lines than to attempt to follow the extremes of style either in short waist, peg tops or tight legs.

For peg tops draft by 2 inch larger seat measure and ½ inch less rise, and a correspondingly large knee and small bottom.

TROUSERS.
Proportionate Sizes.
Sizes 25 to 54.

WAIST	SEAT	RISE	KNEE	BOTTOM	LENGTH
25	33	8½	16½	15	25
26	34	8¾	17	15	26
27	35	9	17½	15	27
28	36	9¼	18	15½	28
29	37	9½	18½	15½	29
30	38	9¾	19	15½	30
31	39	10	19½	16	31
32	40	10¼	20	16	32
33	41	10½	20	16	32
34	42	10¾	20½	16½	32
35	43	11	20½	16½	32
36	44	11¼	21	16½	32
38	45	11¾	21	16½	32
40	46	12	21½	17	32
42	47	12¼	21½	17	32
44	48	12½	22	17	32
46	49	12¾	22	17	32
48	50	13	22½	17½	32
50	51	13¼	22½	17½	32
52	52	13½	23	17½	32
54	53	13¾	23	17½	32

TROUSERS.

DIAGRAMS 19-20.

The size for this draft is 34 waist, 42 seat, 20½ knee, 16½ bottom, 32 length.

The draft as given is for straight leg trousers, with continuous waist band.

The Fore Part.

Square lines A-E and A-K.

A to B is depth of waist or rise, plus 2 inches for waist band, for this draft 12¾ inches.

B to C is the inside length plus ½ inch for make-up, 32½ inches.

D is 2 inches less than half way from B to C.

C to E is width of hem at bottom, 1½ inches.

Square lines B, C, D, and E, and the waist line.

B to F is ½ seat.

F to G is ⅛ seat less ¼ inch. G to H is ½ inch.

(Removing this ¼ inch from the crotch gives a shorter point which is advantageous in cutting and which can be added to the back. No dress is removed from stock patterns).

A to I is 1-12 seat, and I to K is ½ waist.

Draw a line from K to F.

C to L is ⅛ seat.

L to M is 1-3 bottom. M to N is 1½ inches.

Draw a line from B to L and from H to N.

This establishes O and P.

Q is half way between O and P. Place ¼ knee each way from Q.

Finish as represented.

The Back Part.

Cut out the front place on paper and extend the cross lines at waist, fork, knee, and bottom.

B to R is 1 inch.

G to S is 1½ inches.

P to T and O to U is ¾ inches.

L to V is ½ bottom plus ½ inch, and N to W is the same.

Shape the leg from S to V and R to W, springing out slightly at the bottom.

S to X is ⅛ seat.

J to Y is 1-3 seat.

Draw a line from X through Y for the run of the seat seam.

Z to 1 is ⅛ seat.

1 to 2 is ½ waist plus 2½ inches for seams.

Draw a line from 1 to 2.

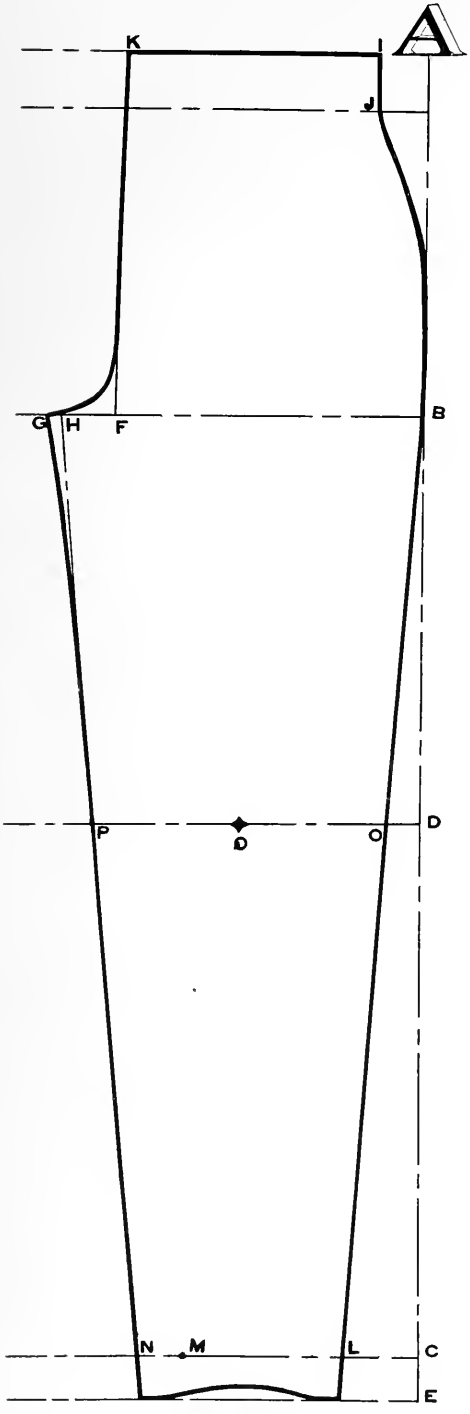


Diagram 19.

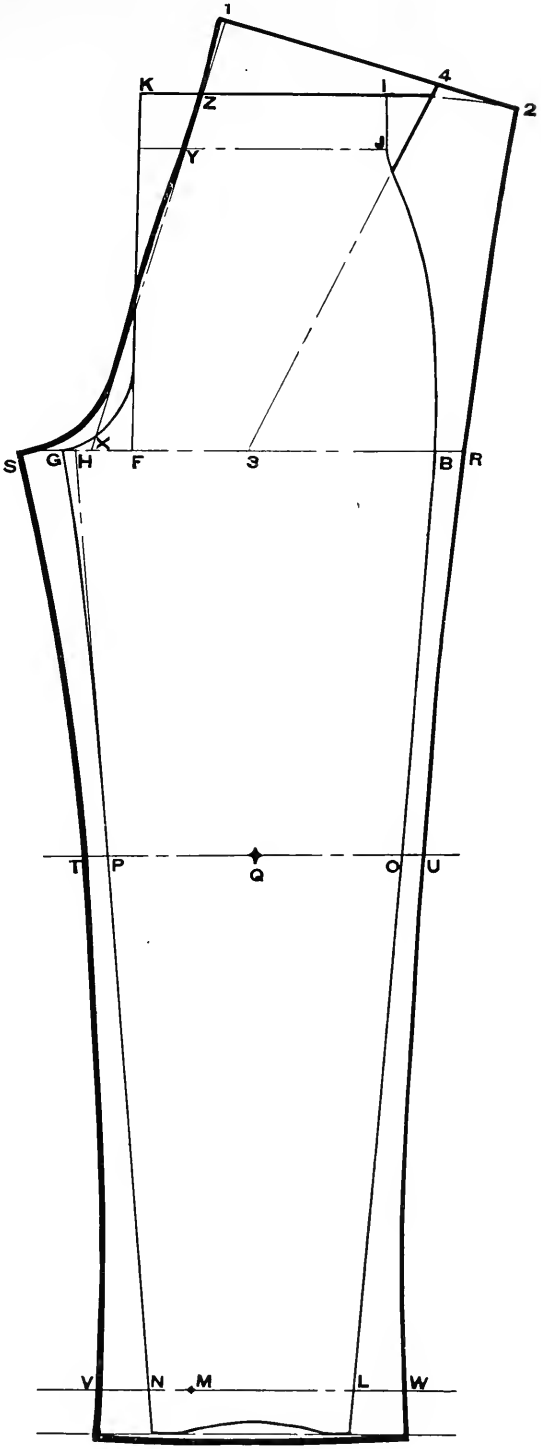


Diagram 20.

Shape as represented swelling the seat line slightly over the full part of the hip and springing out ¼ inch at 1.

Point 3 on the fore part is half way between B and G.

Point 4 is 3 inches from 2.

Draw a line from 3 to 4 and make the dart seam 4 inches long.

The pattern requires about 30 yards per dozen on 28 inch goods without piecing.

FAT MEN'S TROUSERS.

Sizes above 40 waist.

As in Coats, the draft for fat men's Trousers is slightly different from the regular draft.

In all corpulent forms the extra fat of course is most prominent over the abdomen at the waist line.

This not only requires an extended front to provide for this extra form, but also requires a longer fly seam from the crotch up to the waist line in order to bring the waist line straight around the body.

The amount to be added to the top of the waist at K is as follows:

40 waist add ¼ inch.
42 waist add 3-16 inch.
44 waist add ⅜ inch.
46 waist add 7-16 inch.
48 waist add ½ inch.
50 waist add ⅝ inch.
52 waist add 11-16 inch.
54 waist add ¾ inch.

DIAGRAM 21.

The proportions used for this draft are as follows :

Waist 46, knee 22, seat 50, bottom 17, rise 13, length 32.

Commence by squaring lines A-E and A-K.

A to B is the rise plus 2 inches for waist band, this draft also providing the continuous waist band, which of course may always be used or omitted. A to B is therefore 15 inches. B to C is the inside length, plus ½ inch. D is 2 inches less than half way from B to C.

C to E is width of hem at bottom.

Square lines B, C, D, E and the waist line.

B to F is ½ seat. F to G is ⅛ seat less ¼ inch.

G to H is ½ inch.

A to I is 1-12 seat.

I to K is ½ waist measure (23 on division).

Draw a line from K to F.

C to L is ⅛ seat. L to M is 1-3 bottom (17 on 3rds) and M to N is 1½ inches for all sizes.

Draw a line from H to N and B to L.

This establishes O and P.

Q is half way between O and P. Place ¼ knee each way from Q.

Shape as represented, going up 7-16 inch from K for the top of the fore part, sloping the line from this point to I and swelling the fly seam line a proportionate amount just below K.

The Back Part.

Cut out front and extend the cross lines as usual.

B to R is 1 inch (on very large sizes reduce to ⅞).

G to S is 1½ inches (on very large sizes reduce to 1¼ inches).

P to T and O to U is ¾ inch.

L to V is ½ bottom plus ½ inch, and N to W is the same.

S to X is ⅛ seat. J to Y is 1-3 seat. Draw a line from X through Y. Z to 1 is ⅛ seat.

1 to 2 is ½ waist plus 2½ inches.

Draw a line from 1 to 2.

Shape as represented, springing out ¼ inch at 1.

Point 3 on the fore part is half way between B and G.

Point 4 is 4 inches from 2.

Draw a line from 3 to 4 and make the dart seam 4 inches long.

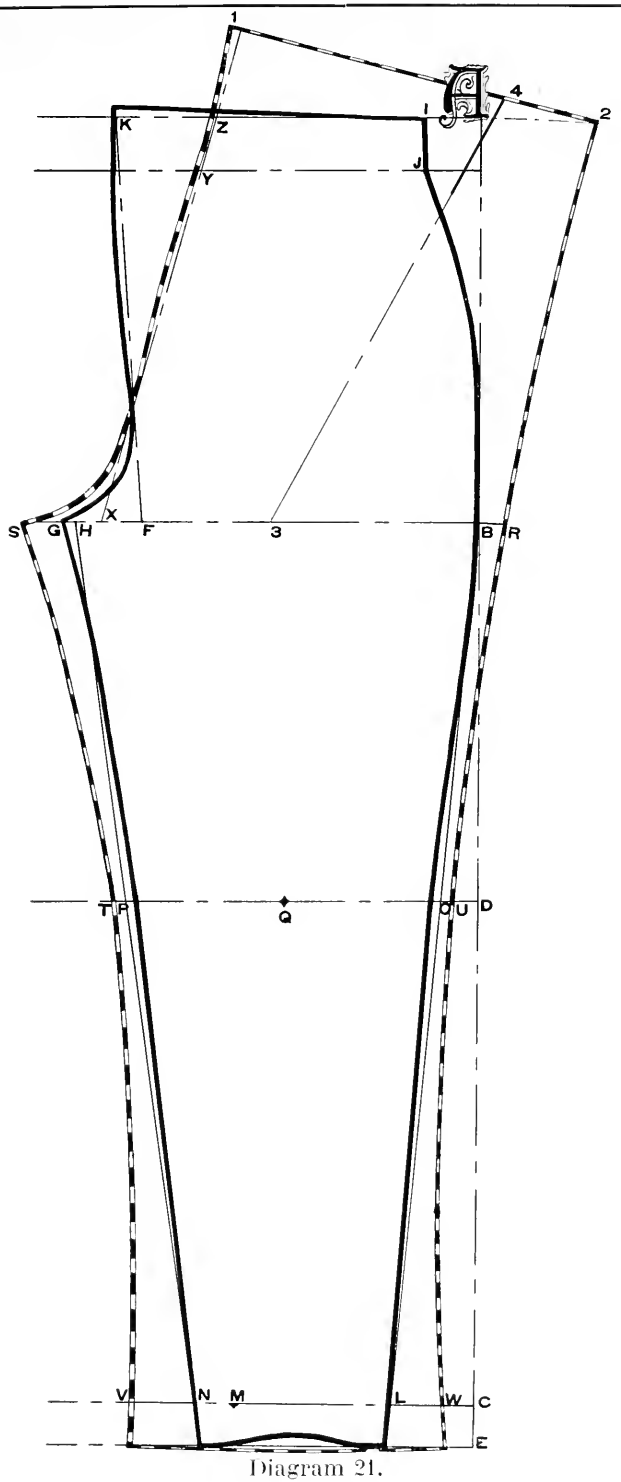


Diagram 21.

PEG TOPS.

DIAGRAM 22.

Draft by 2 inches larger seat measure than is given in the schedule of proportions and ½ inch less rise.

The proportions for this draft are: Waist 32, seat 42, rise 9¾, knee 23, bottom 16, length 32.

Square out and down from A.

A to B is rise 9¾ inches.

B to C is the inside length plus ½ inch.

D is 2 inches less than half way from B to C.

C to E is width of hem at bottom.

Square lines B, C, D, and E.

B to F is ½ seat.

F to G is ⅛ seat less ¼inch.

G to H is ¼ inch.

Square up from F. This establishes I.

I to J is ½ waist.

B to K is ½ inch.

C to L is ⅛ seat.

L to M is 1-3 bottom and M to N is 1¾ inches.

Draw a line from K to L and from H to N.

This establishes O and P. Q is half way between.

If the knee is desired larger or smaller than is obtained by the draft place ¼ knee each way from Q.

Shape the fore part as represented, rounding out well over the hip and gradually tapering in to the bottom.

The Back Part.

Extend the cross lines as usual except the waist line.

K to R is 2 inches and G to S is the same.

O to U and P to T is 1½ inches.

L to V is ½ seat plus ½ inch, and N to W is the same.

I to Y is 1-12 seat.

S to X is 1-6 seat.

Draw a line from X through Y for the seat line.

Y to Z is ⅛ seat plus ½ inch.

Measure the distance from J to K on the fore part and place this amount from R to 1.

Z to 1 is ½ waist plus 2½ inches for seams.

Shape as represented, rounding the out-seam all the way from J to U and tapering in at W.

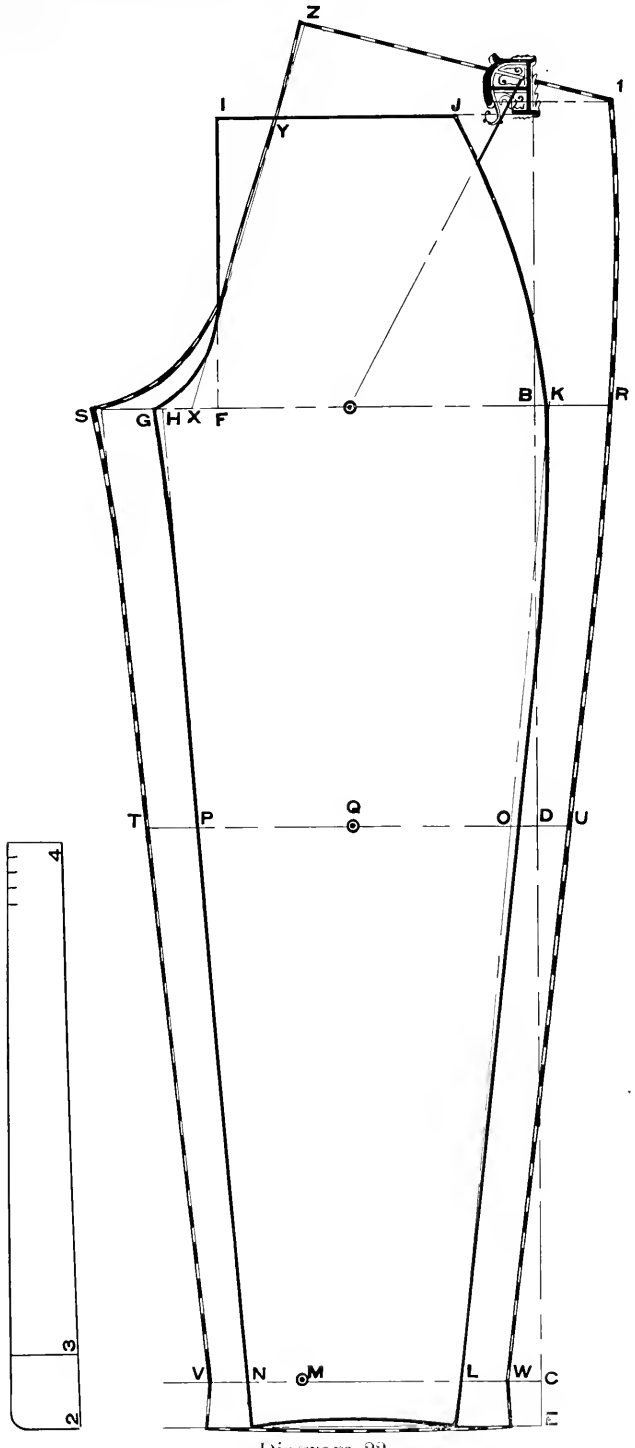


Diagram 22.

The Waist band is 2¼ inches wide at front and 1¾ in back, or according to fancy.

2 to 3 is 2½ inches and 3 to 4 is ½ waist.

The pattern lays well on the stripe and is economical in yardage owing to the narrow front, requiring only about 31 yards per dozen on 28 inch goods for ordinary sizes, without piecing, and is excellent in fitting points.

BOYS' KNICKERBOCKERS AND STRAIGHT KNEE PANTS.

Two drafts are given in each style, one for the larger sizes, embracing usually sizes 8 to 17 inclusive, which are made with fly and suspender buttons, and one for the small sizes, made without fly and open on the side, and which include sizes 4 to 8 or 4 to 9 years.

The Knickerbockers are finished with a strap and buckle at the knee, though the small sizes are frequently finished with a rubber band enclosed in the hem.

AGE	WAIST	SEAT	OUT SIDE	INSIDE	RISE	KNEE	STRAP
4	23½	30½	14¾	7½	7¼	15	12
5	24	31	15½	8	7½	15¼	12¼
6	24½	31½	16¼	8¼	8	15½	12½
7	25	32	17	8¾	8¼	15¾	12¾
8	26	33	18	9½	8½	16	13
9	27	34	19	10¼	8¾	16¼	13¼
10	27½	34½	20	11	9	16½	13½
11	28	35	21	11¾	9¼	16¾	13¾
12	28½	35½	22	12½	9½	17	14
13	29	36	23	13¼	9¾	17¼	14¼
14	29½	36½	24	14	10	17½	14½
15	30	37	25	14¾	10¼	17¾	14¾
16	31	38	26	15½	10½	18	15
17	32	39	27	16¼	10¾	18	15

BOYS' KNICKERBOCKERS.
Sizes 8 to 17.

DIAGRAM 23.
Size 8.

Square out and down from A.
A to B is depth of waist or rise, 8½ inches.
A to C is the outside length, 18 inches to knee.
C to D is the fold, which is 3 inches for all sizes.
A to E is 2 inches for waist band.
Square lines B, C, D and E.
B to F is ½ seat, and F to G is ½ inch.
F to H is ⅛ seat. H back to the dot is ¼ inch.
I is half way between B and H.
C to M is ⅜ inch.
M to I is ½ knee and I to N is ¾ inch.
A to K is 1-12 seat.
K to L is ½ waist. Draw a line from G to L.
Draw a line from the dot through N and from B through M.

Finish as represented, curving in at bottom ¼ inch on each side, swelling the side seams a little above the knee line and making top of waist at L ¼ inch above the square line.

The Back Part.

Extend the cross lines at waist, fork, knee and bottom.
B to O is 1¾ inches.
H to P is 1¼ inches.
M to Q and N to R is ¾ inch.
H to S is 1 inch.
K to T is ¼ seat. Draw a line from S through T.
T to U is ⅛ seat less ¼ inch.
U to V is ½ waist plus 1 inch for seams.
Square down from V to the waist line and finish as represented.

The strap for size 8 should be 12¾ plus 2¾ inches for a buckle strap, and is cut 1¼ inches wide.

There is a special machine, however, made by the Singer Company for putting on the knee strap much quicker than the ordinary way, and for this the knee strap should be cut 2 inches longer to allow for trimming. For the regular folder furnished with the machine the strap should be 1¼ inches wide for light weight goods and 1⅛ inches wide for very heavy goods, such as corduroys, etc., and the lining should be 1¼ inches wide.

JUNIORS—DIAGRAM 24.

The draft is made the same as for the seniors except that ⅝ inch is added at K on the fore part and V on the back part, as shown in the diagram.

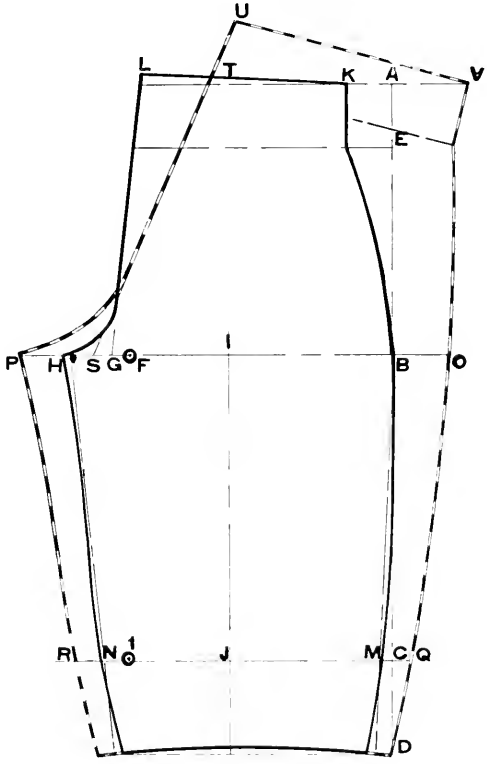


Diagram 23.

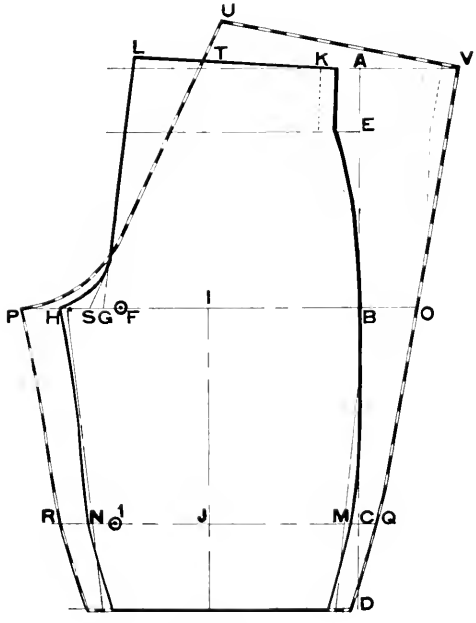


Diagram 24.

BOYS' KNEE PANTS.

DIAGRAM 25.

Square lines A-D and A-L.

A to B is the rise.

B to C is the inside length.

C to D is the allowance for hem at bottom, which for this draft is 1 inch.

A to E is 2 inches for waist band.

Square lines B, C, D, and E.

B to F is ½ seat and F to G is ½ inch.

F to H is ⅛ seat. H back to the dot is ¼ inch.

I is half way between B and H.

Square down from I.

J to N and J to M is ¼ knee (13 on fourths).

Draw a line from the dot to N and from B to M.

A to K is 1-12 seat. K to L is ½ waist.

Draw a line from L to G.

Shape as represented, raising the waist line ¼ inch above the square line at L.

The Back Part.

Extend the cross lines as usual.

B to O is 1 inch, and H to P is 1 inch.

N to R is ¾ inch and M to Q is the same.

H to S is 1 inch. K to T is ¼ seat. Draw a line from S through T.

T to U is ⅛ seat less ¼ inch.

Make U to V ½ waist plus 1 inch and shape as represented

JUNIORS—DIAGRAM 26.

The draft is made the same as for the seniors except that ⅝ inch is added at K on the fore part and V on the back as shown in the diagram.

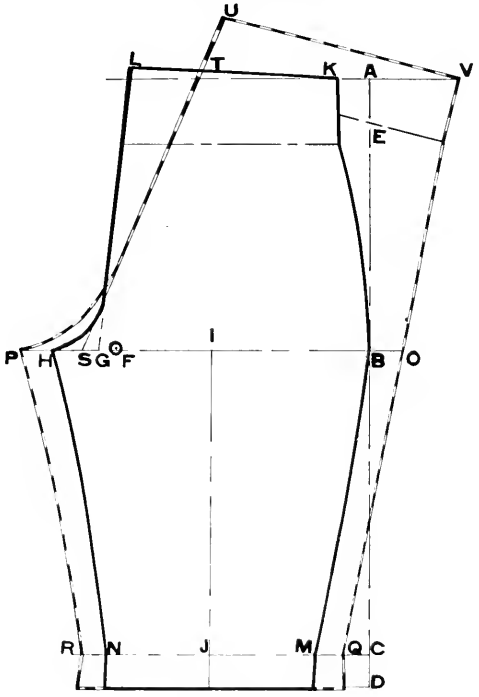


Diagram 25.

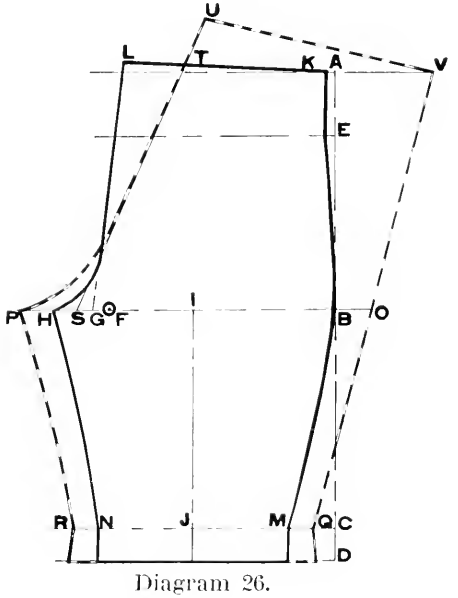
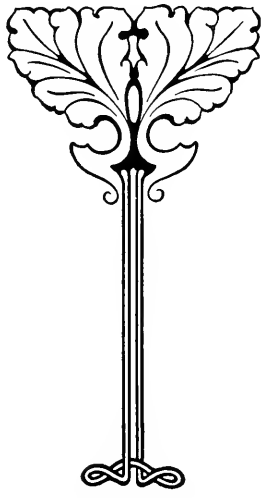


Diagram 26.



SHIRTS.

The Shirt is known by the size of the collar rather than the breast size, but as there is a relative proportion between the size of the collar and the breast size, especially for the normal figure, a table of proportions showing this relation is here given:

Proportions.

Breast.	Collar.
24	12
26	12½
28	13
30	13½
32	14
34	14½
36	15
38	15½
40	16
42	16½
44	17
46	17½
48	18
50	18½
52	19

THE SHIRT.

DIAGRAM 27.

The shirt is drafted by the breast size. The neck, collar, and collar band, by the neck or collar size. The usual size neck or collar for a 36 breast is 15, which are the sizes used in this draft.

Commence by squaring lines A-C and A-G.

A to B is ½ breast plus 1 inch.

A to X is 1 inch.

A to E is natural waist, 17 inches; — to C is full length, 36 inches.

Square lines B, X and E.

A to F is 1-6 neck (15 on 6ths).

F to the circled point is ¼ breast, and circled point to G is ⅛ breast.

Square down from G and draw a line from F to H.

By this line square up and down from F and up and down from H.

H to K is 2 inches, and F to L is the same.

Draw a line from K to L.

H to J is 1 inch. Draw a line from J to I.

A to D is 1-3 neck (15 on thirds).

Shape the neck gorge from A to I and I to D, and the yoke from A to L.

B to M is 1 inch less than ½ breast.

M to N is 1-6 breast plus ½ inch.

Square up from M and down from N.

Shape the arm hole from J to N.

O to P is 1 inch.

Shape the side seam as represented.

The Back Part.

D to U is 1 inch.

Draw a line from U through J and make J to T 1¼ inches.

M to W is 1-12 breast, and M to Q is ¼ breast.

Square down from Q.

R to S is 1 inch.

C to V is ½ inch.

Shape the arm hole from T to G and the side seam from Q, making the back 1 inch longer than the front.

The solid lines represent the front. The light doubles lines the yoke. The paneled lines the back.

The extra width on the back from J to T is gathered in on the yoke in the center, or distributed evenly across the yoks as may be desired.

The lines 1-1 indicate respectively the front and back shoulder seams for a shirt with a yoke.

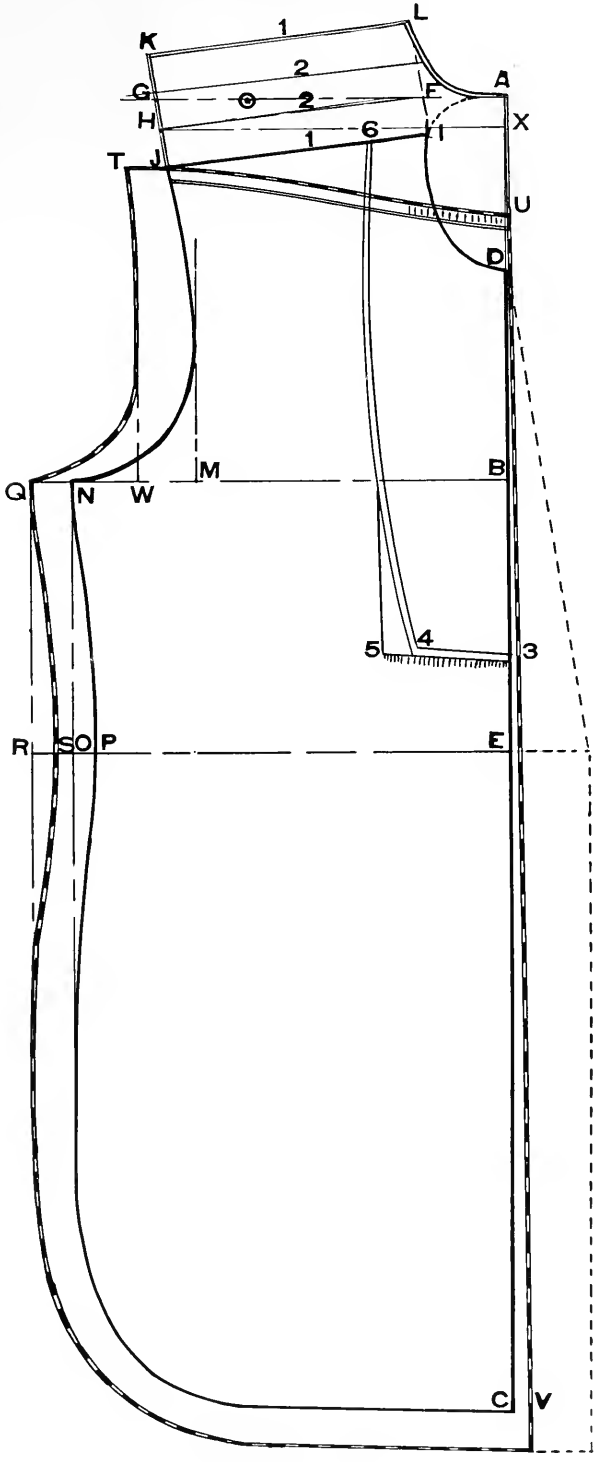


Diagram 27.

The lines 2-2 indicate the shoulder seams for a shirt without a a yoke, which is frequently used on cheap working shirts. In this case the back is not extended from J to T. Sometimes where this is used a single yoke piece is stitched on the outside of the back part.

Add nothing for seams.

THE BOSOM.

The bosom is almost entirely a matter of style or taste, but the lines 3, 4, 5 and 6 indicate the method of cutting.

1 to 6 is 1½ inches more or less according to taste.

D to 3 is the length, 10 to 15 inches.

3 to 4 is the width at bottom.

4 to 5 is 1 inch taken out, in a V, the line 3-5 of the shirt being gathered in on the line 3-4 of the bosom.

THE SLEEVE.

DIAGRAM 28.

Square lines 7-8-9.

7 to 8 is the length, 24 inches.

7 to 9 is ½ breast plus 2 inches.

Square out from 9. 9 to 10 is 2½ inches.

8 to 11 is the width at wrist, for this draft 7 inches.

Draw a line from 9 to 11.

11 to 12 is 3 inches. Square back from 12 for the opening, which should be 5½ inches deep from the cuff or wrist band.

The wrist band should be 10 to 11 inches and the sleeve fullness is gathered in near the seam.

THE CUFF.

The length is 11½ inches from outer end of button holes.

The width is 2½ to 3½ inches, according to fancy.

The band is ¾ inch wide.

THE COLLAR.

Two very popular styles are shown.

No 1 is a turn down, 1½ in the back, 1⅞ in front.

Square lines A-1-B-1.

A to B is the size of neck, 15 inches.

C is half way between A and B. Square across from C.

C to D is 1¾ inches.

A to 1 and B to 1 is 3½ inches.

C to the bottom line of the band is ¼ inch.

From A to the end is 1 inch, and from B to the end is 1¼ inches.

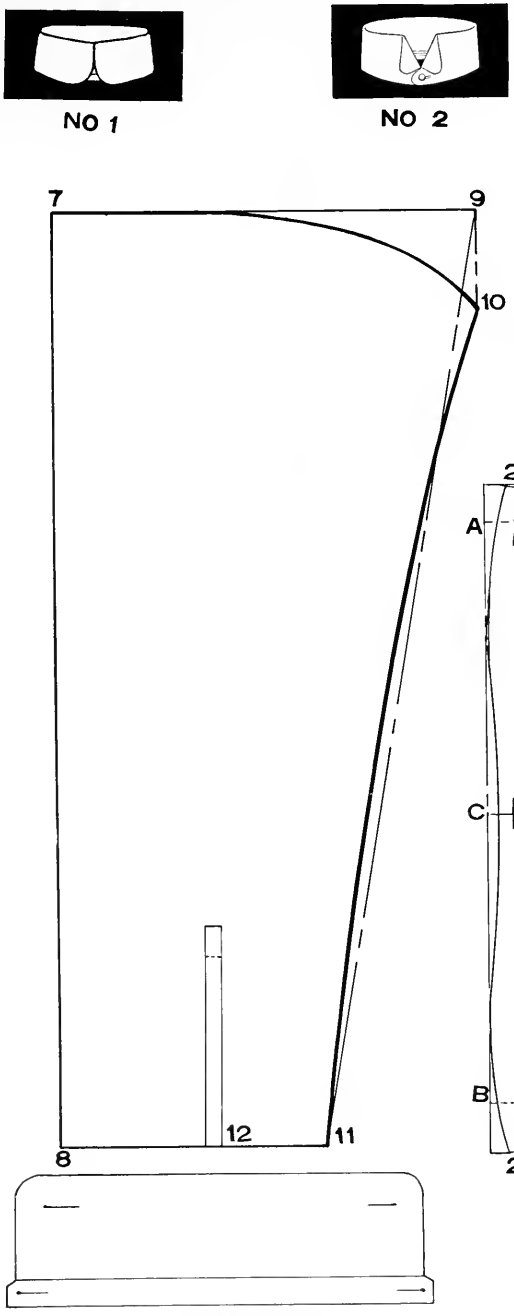


Diagram 28.

Points 2 are ½ inch from the square line.

Shape as represented, taking out ¼ inch between the collar and band at V.

No 2 is a standing collar, 1½ in the back and 1¾ in the front.

Square lines 4-4 and apply the length from button holes.

5 is half way between.

5 to 6 is 1⅞ inches.

Hollow the lower edge ¼ inch at 5, and the upper ⅛ inch at 6, and turn up the ends ¼ inch at each 4.

THE OVERALL.

A FEW ACCESSORIES.

On the opposite page are shown a few minor parts of garments, with which most all cutters are familiar, but which may be useful to the less experienced.

Diagram 29—Is a double front for overalls, and is cut generally from 7½ to 9 inches in width and 26 to 28 or 30 inches in length. The pocket stitching should come a little below the bottom of the fly.

Diagram 30—Shows a very good design for a miner's overall. The knee patch A is cut 14 inches square and is set on flush with the in seam of the front with about two-thirds of the patch below the knee line. The opening at 2 is a small hemmed opening through which excelsior or other padding material may be stuffed. The seat patch B is cut about the same size as the knee patch except that it is made to fit the seat line, and is cut round or square according to fancy.

Some reduction may be made in yardage in this garment by piecing on the line 3-4 and the piece seam is neatly covered by the patch seam. The back pocket may also be made in the patch as shown in the sketch, which will not only economize in cloth, but in labor as well, and if flaps are desired over the pockets they may be inserted in the piece seam above the pocket.

Diagram 31—Shows another form of seat patch or double seat, known as the saddle seat, and which is very good on overalls for farmers, loggers, etc. This may also be continued down the in-seam of the leg in a 4 inch strip, making an excellent saddle reinforcement.

Diagram 32—Shows the method of adding the welt seam to trousers. Many good cutters have made an almost fatal mistake in attempting to produce the open welt seam. Some, for instance, in attempting to produce an half-inch welt add one inch to the front, others add one inch to the back, while still others add only one-half inch to the back. In either case there is an improper lap at the pocket, and in the latter case the result is a twisted garment, and, unless the pattern is cut larger than it is intended to make up, it will make up one inch small in the seat, because one-half inch is taken from the garment at each hip to make the welt seam.

The proper way is to add ½ inch (or the width of the welt) to each part, both back and front. The seam is then sewed as shown by the small dotted line on the back part, and when turned, the welt falls into its natural position ready to be stitched down.

Diagram 33—Shows a very economical front pocket for trousers or overalls.

To draft—Square lines 1, 2, and 3.

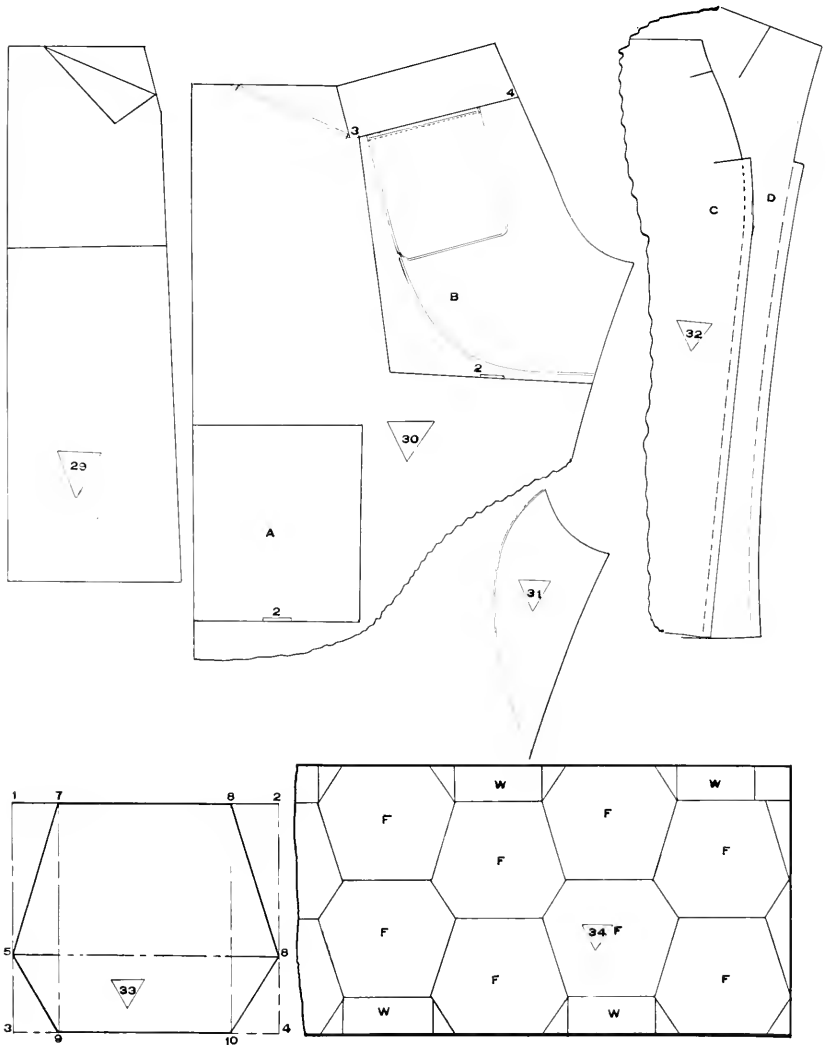
1 to 2 is the full width, 14 to 15 inches.

1 to 3 is the depth, 12 inches.

Square down from 2 and across from 3, which establishes 4.

4 to 5 is the width of opening plus 1½ inches, 8 inches in all. Square across from 5.

1 to 7 is 2½ inches. 7 to 8 is 9½ inches.



Square down from 7 and 8 and finish as represented.

Diagram 34—Shows the manner of laying same on the cloth, by which it will be observed that the pattern fits together perfectly on 28 inch goods, giving one watch pocket on the side for every two front pockets, and the actual waste is represented by the small triangular pieces at the end of the watch pocket. The waste therefore is reduced to th minimum and if a pocket trimmer (over seamer) is used it merely rounds the corners instead of cutting off a large piece, as is frequently the case. The pocket also stands well away from the side seam, an advantage to the wearer worthy of notice.

THE OVERALL.

DIAGRAM 35-36.

Waist 36, seat 44, rise 11¼, knee 23, bottom 20, length 32.

Use the proportions given for trousers.

Commence by squaring A-C and A-J.

A to B is the rise, 11¼ inches for this draft.

B to C is the inside length plus ½ inch.

C to E is 1 inch for hem.

D is 2 inches less than half way from B to C, but is seldom used, especially where the garment is to be fell seamed on a machine equipped with folder, the notches being troublesome in passing through the folder.

Square lines B, C, D and E.

B to F is ½ seat, and F to G is 2 inches.

Square up from F. This establishes I.

I to H is ½ waist plus ½ inch.

K is half way between G and B.

Square down from K.

This establishes N.

N to M is ¼ bottom, and N to L is the same.

Draw a line from B to L and shape the out seam from H to B.

Draw a line from M through G to J.

Delineate the fly seam line from I to G, and notch in 1½ inches, as indicated at G.

The flap I-J-G is left on to be used as a fly. On the right fore part it is folded back to the line I-F and stitched down, forming a button stand. On the left fore part it is turned back at the line I-F, forming a fly facing.

Finish and cut out the front as represented.

The Back Part.

Lay the front on paper and extend the cross lines at waist, fork, knee and bottom.

B to R is 1 inch.

G to S is ⅛ seat.

P to T is one inch, and O to U is the same.

M to V is 1 inch, and L to W is the same.

Draw a straight line from W through R to Y, and shape the in seam from V through T to S.

Extend the line F-I, making I to X ⅛ seat.

Draw a line from X to Y.

Y to Z is ½ waist plus 2 inches for seams.

Draw a line from Z to G on the fore part for the run of the seat seam.

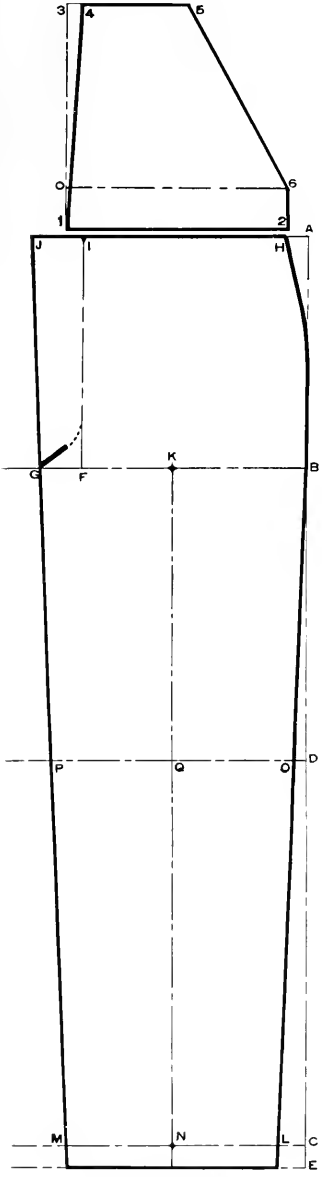


Diagram 35.

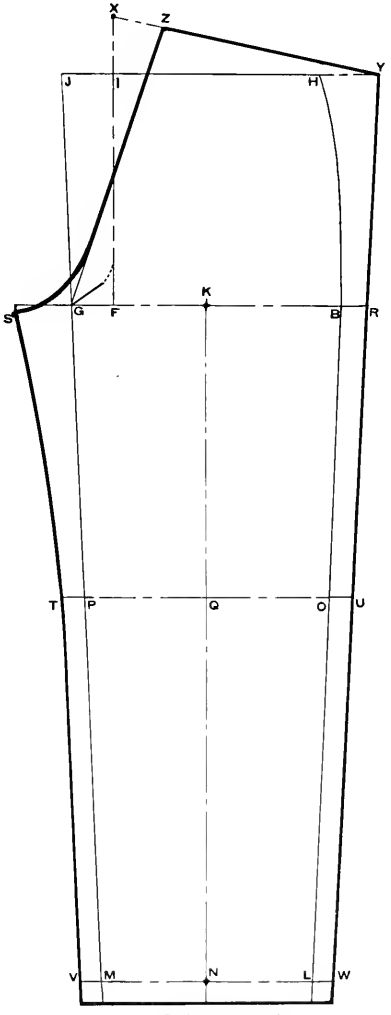


Diagram 36.

The Apron—or Bib.

Square lines 1, 2 and 3.

1 to 2 is the width of the fore part from H to I plus ¾ inch.

(Bear in mind that H to I is ½ inch more than ½ waist).

1 to 0 is the width of band, and 1 to 3 is the heighth, which for this draft is 11 inches.

Square across from 3 and O and up from 2 to 6.

3 to 4 is ½ inch, 4 to 5 is width at top. Draw a line from 5 to 6.

ONE SEAM OVERALL.

DIAGRAM 37.

Waist 34, seat 42, rise 11, knee 23, bottom 20, length 32.

Commence with the line A-B and draft from the bottom.

B to the double circled point is the inside length plus 1½ inches for seams and hem.

Square each way from B.

B to C is ½ bottom.

B to D is ½ bottom plus 1 inch for seams.

B to 1 is ¼ bottom, and B to 2 is the same.

Now sweep from the double circled point to 4, pivoting at 1, and from the same point to 7, pivoting at 2.

From double circled point to 3 is ½ seat, and from same point to 5 is ½ seat.

From 3 to 4 is 2 inches, and from 5 to 6 is 1-12 seat.

Draw straight line from the double circled point to 4, and from same point to 6. 6 to 7 is ⅛ seat.

Square up from 3.

3 to 8 is the rise, 11 inches.

Square back from 8 to 10.

8 to 9 is ½ waist, 8½ inches, plus ½ inch.

8 to 10 is ½ full waist measure plus 2½ inches for seams.

Square up from 10.

10 to 11 is 1-12 seat. Draw a line from 9 to 11 for the top of the back, and from 11 to 6 for the run of the seat seam.

Draw a line from C through 4 to the waist line.

The fly notch is inserted in the same manner as in Diagram 35.

Finish as represented, making 7 to 9 a full quarter inch shorter than 4 to C especially if joined on a two needle felling machine, as this edge of the pattern lays somewhat bias on the cloth, while the line C-4 lays straight with the selvage.

The fly flap is left on as in Diagram 35, but for economy may be cut off, as shown by the paneled line E-C, and a piece sewed on, as shown by the light dotted line.

This is generally done and must be when the bib or apron is cut on the overall, which is shown by the extension of the paneled line.

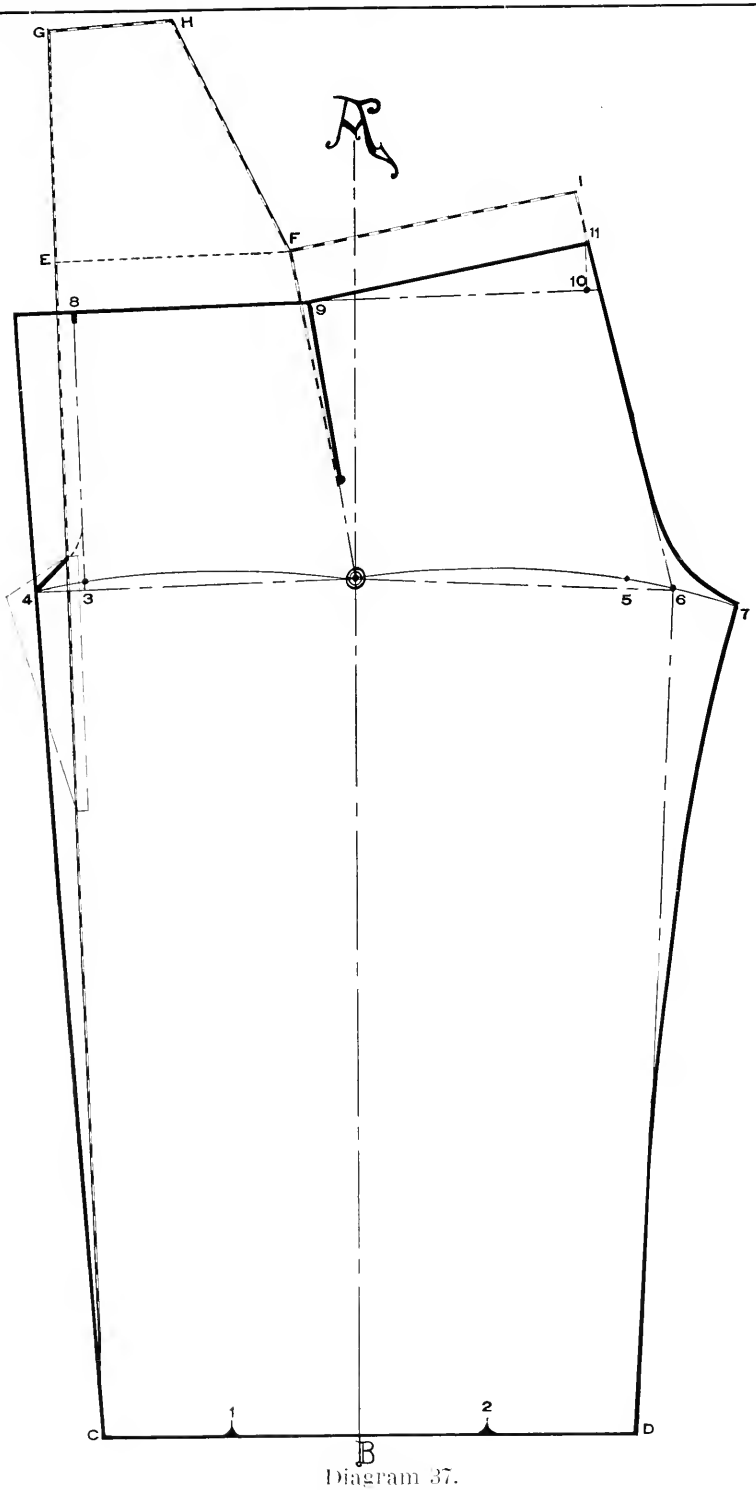


Diagram 37.

The paneled line is ⅝ inch from 8.

From 8 to E, 9 to F, and 11 to I is 2 inches, or width of band.

E to G is 9 inches, and G to H is 5 inches.

JACKETS.

DIAGRAM 38.

The better grade Overall Jackets are cut like a coat, the sack coat draft shown in Diagram 5 being suitable, using the proportions given for duck coats (1 inch larger breast measure), leaving out the under arm cut and making the suppression at the waist 1¼ inches.

For the cheaper grades, however, the square jumper is still in use, and a suitable draft is herewith given.

The draft is for a 38 breast, length 30 inches.

Square out and down from A.

A to B is ½ breast plus 1¾ inches.

A to C is full length.

A to D is natural waist, 17 inches.

Square lines B, C, and D.

B to I is ½ breast.

I to E is 2 inches.

E to J is ⅛ breast.

E to F is ½ breast. F to G is 3 inches.

G to H is 2 inches.

Square up from I and J, and up and down from E, G, and H.

This establishes K and L.

A to N is ⅛ breast plus ⅝ inch, and N up to O is ⅝ inch.

L to M is ⅛ breast plus 1 inch.

K to P is ⅛ breast.

Draw a line from M to P and O to P.

O to Q is 1-3 breast plus 1½ inches, and M to R is the same.

L to S is ¼ breast.

Shape as represented.

G to H is a 2 inch facing cut on which turns back on the line S-G.

The Sleeve.

Square lines 1, 2 and 4.

1 to 2 is the length, 22 to 24 inches.

1 to 4 is ½ breast, and 4 to 5 is 2 inches.

2 to 3 is 5½ inches. Draw a line from 3 to 5 and finish as represented.

The dotted line 0-0 shows the usual method of piecing.

The sleeve is finished with a cuff or wrist band to button over like a shirt, usually 1½ to 2 inches wide.

The collar is the same as for a work shirt.

Draw the line 1-4.

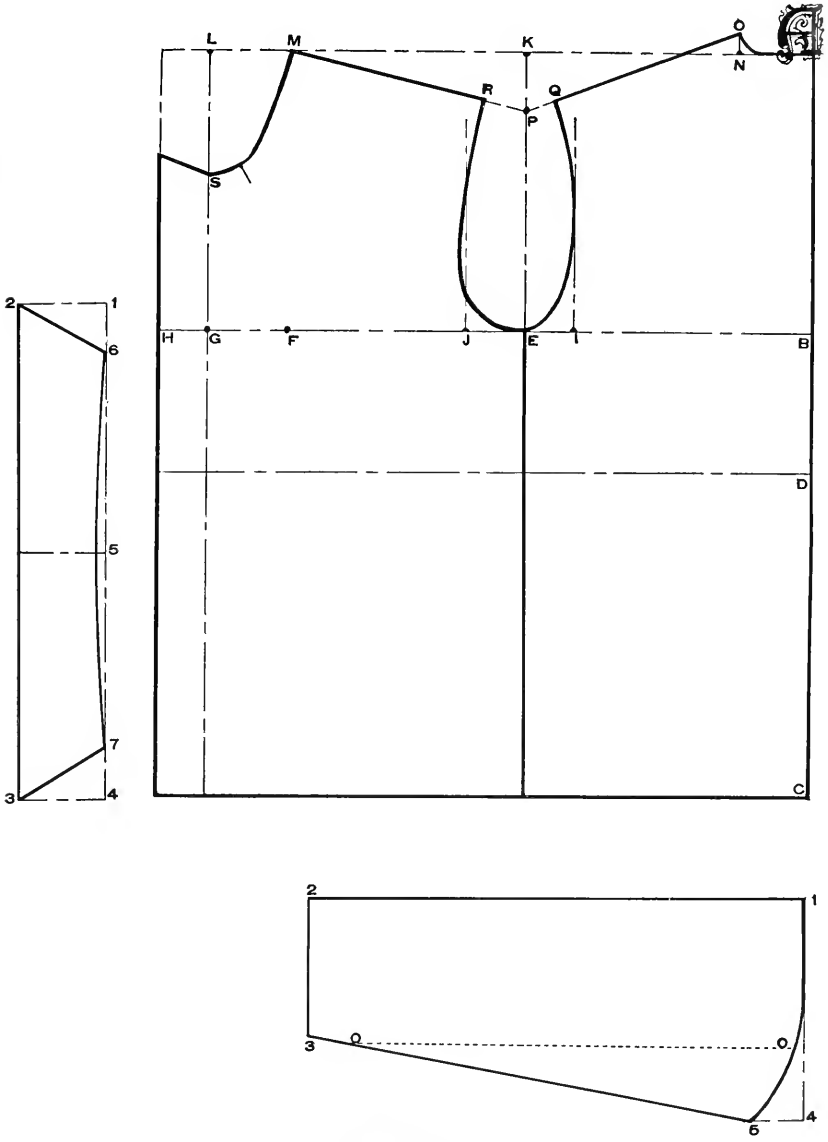


Diagram 38.

Square out from 5 and place ½ the collar length each way from 5 as at 6 and 7.

From 6 to 1 and 7 to 4 is the extension for the point which in this case is 2 inches.

1 to 2 and 3 to 4 is the width, 3½ inches, including seams.

DRAWERS.

DIAGRAM 39.

The proportions for the draft are: Waist 32, seat 40, rise 10, length 32, bottom 9.

To Draft:

Fold the paper on the line A-B and commence at the bottom, squaring out from B.

B to 6 is ½ bottom.

1 is half way between B and 6.

B to C is the inside length.

Sweet from C, pivoting at 1.

C to 2 is ½ seat. 2 to 3 is ⅛ seat.

Draw a line from C to 3, and by this line square up from 2.

2 to 4 is the rise, 10 inches.

Square back from 4.

4 to 5 is ½ waist. Shape the front as represented.

3 to 7 is 1-12 seat.

7 to 8 is ⅛ seat.

4 to 9 is ⅛ seat. Draw a line from 9 to 0.

Apply the waist measure from 4 to 5, and 0 to 10, adding 1 inch for seams. The shaded part from 0 to 5 represents a 1¼ inch V or pleat to be laid in the side. Draw a line from 10 to 8 for the seat line, add 1 inch from 6 to 11 and shape as represented. The dotted line 12-X represents a button stand to be added to the front.

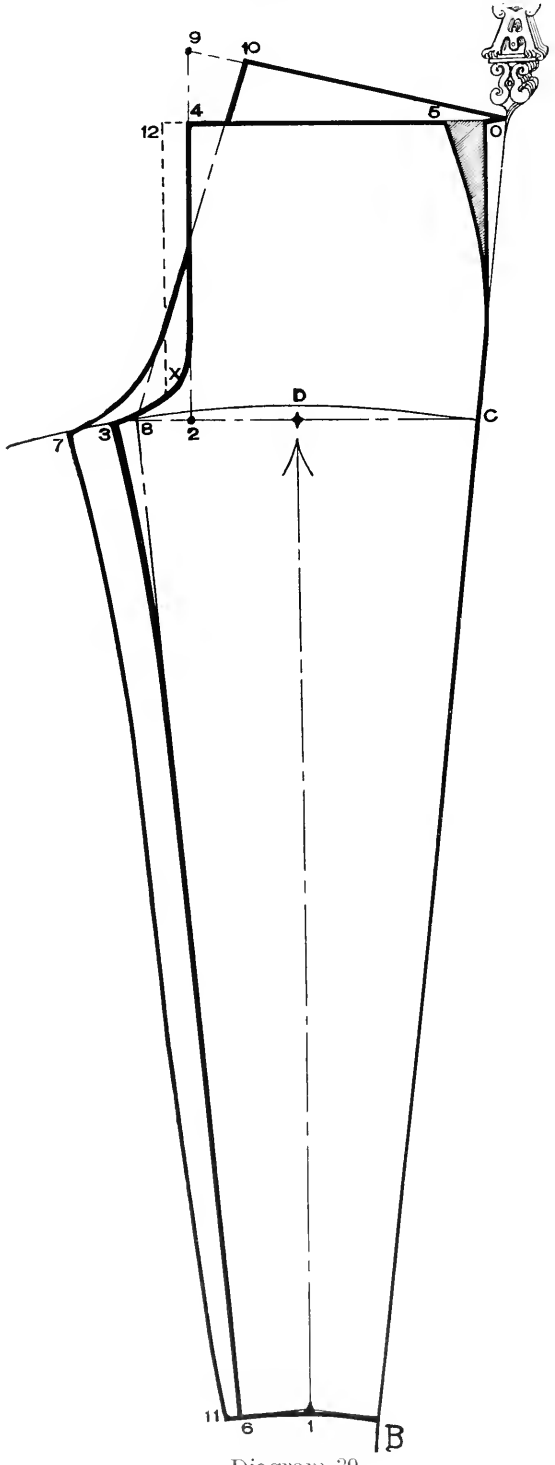


Diagram 39.

LEGGINGS.

DIAGRAM 40.

The size is based on the size of the calf, and run as follows:

Boys'—10, 11, 12, 13.

Men's—14, 15, 16, 17, 18.

The drafting power is the size of the calf and the draft is as follows, size 15:

Draw the center line A, B, C, D.

A to B is ¼ calf (15 on fourths).

A to C is the length, 16½ inches, which includes seams.

Usually all sizes are made the same length.

C up to D is ¼ calf.

Square each way from A, B, C, and D.

A to E is 1-3 calf, and E to F is 1½ inches.

A to G is 1-6 calf, and G to H is ¾ inch.

Square up from E, and down from F and H.

This establishes I, J, K, L, and M.

E to R is ⅛ calf. Shape the top from H to R.

Draw straight line from E to L.

M to N is ⅛ calf. Shape the front from R to N, as represented.

I to Q is ½ inch. J to P is 1 inch. M to I is ½ inch.

Shape the back from H to O and the bottom from O through 1 to N.

The opening is on the line A-C and a facing of 1½ to 2 inches is added to the back part.

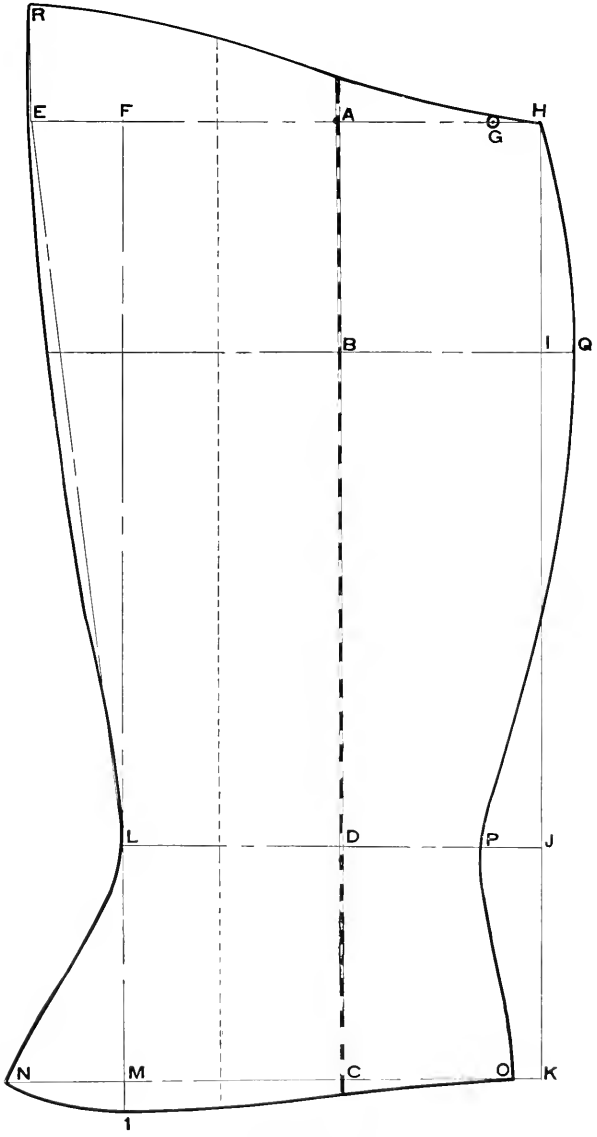


Diagram 40.

THIGH LEGGINGS—DIAGRAM 41.

The principle of construction is the same as for the Leggings in Diagram 40, but the seams are laid somewhat differently.

The draft is for the same size (15) and is as follows:

Draw the center line A-C extending it upwards from A but using A as the starting point in the draft.

A to B is ¼ calf. — to C is the length, 16½ inches.

C to D is ¼ calf. Square each way from A, B, C and D.

A to E is 1-3 calf, and E to F is 1½ inches.

A to G is 1-6 calf, and G to H is ¾ inch.

Square up from E, and down from F and H, extending line H upwards to T.

E to R is 4½ inches, and R to U is 1-6 calf.

Square back from R. This establishes S and T.

S to W is ¼ inch less than ⅛ calf.

T to V is ⅝ inch. Shape the top from V to U through W.

X to L is ¼ inch. Draw line from E to L.

M to N is 1-12 calf. Shape the front from U to N, curving out about ¼ inch at E and R, and in a trifle above L.

M to Y is ⅛ calf, and Y to I is ½ inch.

I to Q is ¼ inch, and J to P is ¾ inch.

Point O is ¼ inch above K.

Finish as represented.

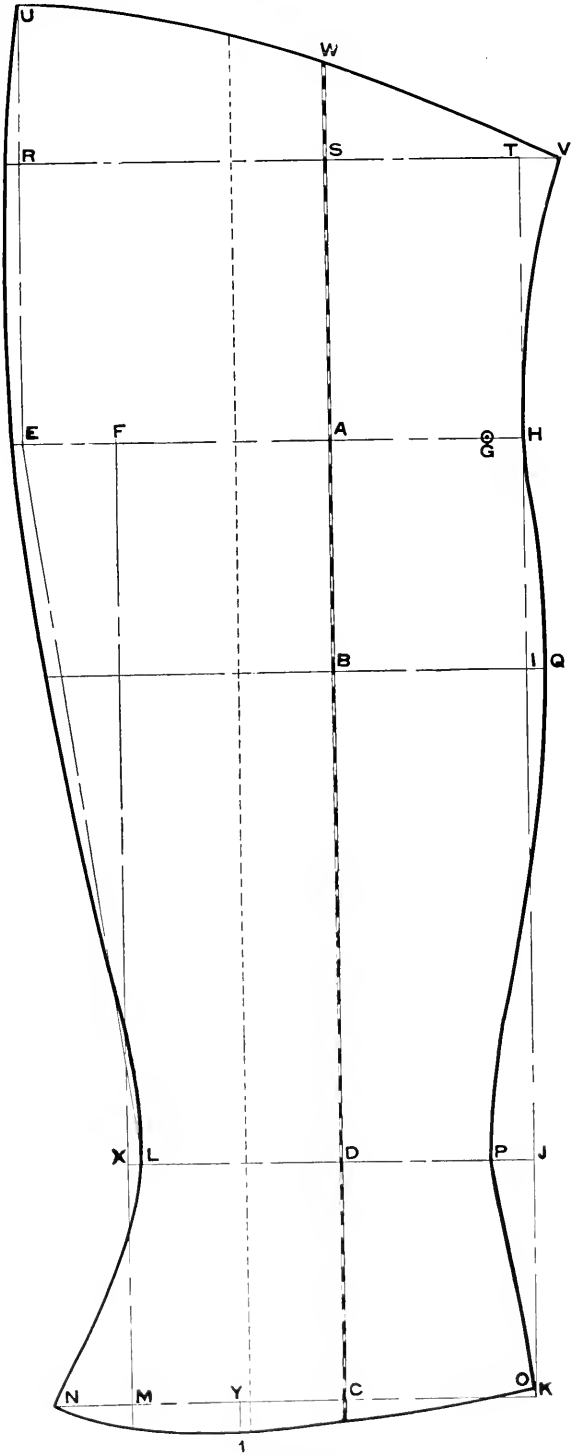


Diagram 41.

GRADING.

Unquestionably the system which is most valuable to the manufacturing or custom cutter is that which gives correct proportions for the average forms of all sizes.

In this respect especially are existing books on cutting deficient, so far as the needs of the manufacturing cutter are concerned, for to him, proportionate sizes are a necessity.

Since the drafts by this system are obtained almost entirely by the proportionate division of the breast and seat measures, little more is needed, but there are some measurements that are not regulated by the breast and seat measures, and these are given in connection with the Grading System.

By a correct grading system the cutter is enabled to produce an entire set of patterns of any style from a single pattern of any size, regardless of the system by which the original draft was produced.

The chief advantage of grading lies in the fact that a set of patterns produced in that manner from one original draft will each have the same shape and appearance and a uniform proportionate increase, which is not always the case where a draft is made for each size.

The best size for a model is a 36 coat, and a 30 (waist) trouser, grading up for the larger sizes and down for the lesser.

The grade, however, must be performed by sections. For instance, in grading coats, the grade must first be made from 36 up to 42, then from 42 up to 48, then above 48, then from 36 down to 32, then from 32 down to 24, for the simple reason that inasmuch as there is a difference in the draft in these various groups of sizes, so also must there be a difference in the grade.

THE SPACER.

Before taking up the question of grading in detail, however, we will devote our attention to the ingenious little device known as the spacer, which if properly understood and used will not only save time, but perhaps avoid slight discrepancies in measurement that might afterward prove troublesome.

The spacer is made by drawing a series of lines from a given starting point one inch apart to a common center, and, is used to divide the space between the model and the largest size into the required number of equal parts.

In the spacer given, however, as an additional convenience, cross lines have been made at the correct position on the spacer for sixteenths, eighths, sixths, fourths, thirds, halves, two-thirds, and three-fourths inches, and for 3-16th, all of which are the measurements most commonly used in grading, and the spacer is reproduced in the book in correct proportion to permit the use of same if desired.

While the spacer and the method of making same is familiar to most cutters, and particularly to draftsmen, the one here given will doubtless be found convenient on frequent occasions, and may be used in many ways.

Patterns may be graded in at least two different ways: First, by using two patterns, a large and a small size, in which case the small size is placed upon the large one, giving an equal distance between all the points, and dividing the distance between the outer and inner pattern proportionately by the lines on the spacer, according to the number of sizes desired.

To do this, take a small strip of paper, place it on the patterns, and mark at the outer edge or point of both patterns. This gives the width between the two. Now place the strip of paper on the spacer with one mark at 0, and move the paper downward toward the point of the spacer until the other mark comes on the line representing the number of sizes to be graded.

For instance, in grading coats from 36 to 42, the number of sizes would be six.

0 therefore would represent the 36 size and line six the 42. Then mark at each intervening line, which will give the correct spacing for all sizes from 36 to 42.

The same rule applies for the spacing on all other patterns.

The other method is to grade from a single pattern, which, when the proper increase for each point is known, is very simple, and is perhaps the better method.

The table on the following page gives the correct rate of increase for all sizes of all garments, and when used in connection with the spacer on the opposite page, a set of patterns can be produced accurately, and in less time than in any other way.

TABLE OF PROPORTIONS
For Grading.

SIZES	COATS						SLEEVES	
FROM	GRADE	TOP OF BACK	FRONT SHOULDER	BREAST LINE	LENGTH AT BOTTOM	WIDTH AT TOP	LENGTH AT BOTTOM	
36 TO 42 Grading From 36	INCREASE	3/16	3/16	1/4	1/4	3/16	1/4	
42 TO 48 Grading From 42	INCREASE	1/8	3/16	1/4	1/4	3/16	1/4	
48 UP Grading From 48	INCREASE	Top of Back Only 1-16	3/16	1/4	1/4	3/16	1/8	
36 TO 32 Grading From 36	DECREASE	3/16	3/16	1/4	1/2	3/16	1/2	
32 TO 24 OR 17 TO 4 YEARS Grading From 32	DECREASE	3/16	1/6	1/6	1/2	3/16	1/2	

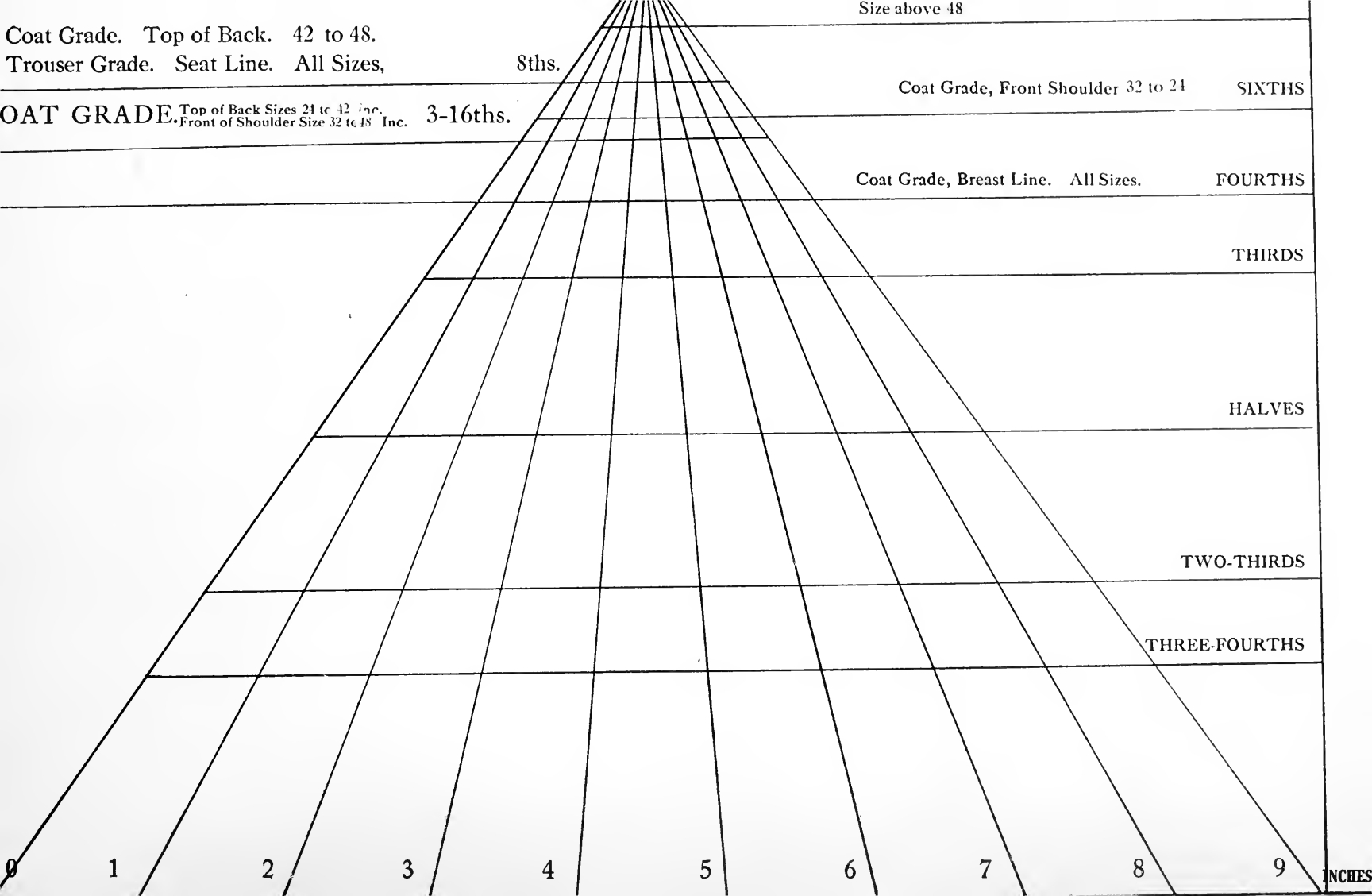
VESTS.

		TOP OF BACK	FRONT SHOULDER	BREAST LINE	LENGTH AT BOTTOM		
36 TO 42 Grading From 36	INCREASE	3/16	3/16	1/4	1/4		
42 TO 48 Grading From 42	INCREASE	1/8	3/16	1/4	0		
36 TO 32 Grading From 36	DECREASE	3/16	3/16	1/4	1/4		
32 To 25 Or 17 To 8 Grading From 32	DECREASE	3/16	1/6	1/6	1/4		

SIZES	SHIRTS & JACKETS						SLEEVES	
FROM		Top of Back	Top of Front at Opening	Front Shoulder	Breast Line	Waist Line	Width at Top	LENGTH
36 to 48 COLLAR 15 to 18 Grading From 36	INCREASE	1/4	1/8	1/4	1/4	1/4	1/4	0
48 to 52 COLLAR 18 to 19 Grading From 48	INCREASE	3/16	1/16	1/4	1/4	Fr'nt 2-3 Side 1-3 of excess	3/16	0
36 to 24 COLLAR 15 to 12 Grading From 36	DECREASE	1/4	3/16	1/4	1/4	1/4	1/4	1/2

From 36 to 24 Decrease length of skirt one-half inch for each size.

For the proportionate increase on Trousers, Overalls, Knickerbockers, Leggings, etc., see instructions in the following chapter.


Size above 48
Coat Grade. Top of Back. 42 to 48.
Trouser Grade. Seat Line. All Sizes,
8ths.
Coat Grade, Front Shoulder 32 to 24
SIXTHS
OAT GRADE. Top of Back Sizes 24 to 42 Inc. Front of Shoulder Size 32 to 48 Inc.
3-16ths.
Coat Grade, Breast Line. All Sizes.
FOURTHS
THIRDS
HALVES
TWO-THIRDS
THREE-FOURTHS
0
1
2
3
4
5
6
7
8
9
INCHES

COATS—DIAGRAM 45.

For a set of coat patterns draft a 36 size, cut it out and reproduce it in the heavy pattern paper, cutting the lines accurately and smoothly, taking care that it is well shaped, so that it may be used for shaping the remainder of the set.

Now take the original pattern, lay on paper with the back and front well apart, and mark carefully around each, and extend the breast line on each side and the center of back line above and below.

Point D forms the grading point for the back. Draw a line from this point through points 2, 3 and 4.

Now apply the increase at the top of back, as shown in the table on the opposite page, which for this point is 3-16.

This can best be applied by using a small strip of paper and obtaining the divisions from the 3-16ths line on the spacer. The measurements on a rule or square are so close together that they are more or less confusing, especially on divisions of 3-16ths.

Having obtained the proper divisions on the strip from the spacer, apply it to the top of the back and mark for each size from 36 to 42 above the collar line and from 36 down to 32 below the line.

As the lines at 2, 3 and 4 are to parallel, apply the same measurements at these points. Now measure down at bottom ¼ inch for each size and square across. Extend the line from 4 for the outside or largest size down to the intersection with the bottom line of the same size and draw a line from this intersecting point to the corresponding point on the model. This completes the grade for the back.

Fore Part.

Point A is the grading point for the front and corresponds to point I in the draft (see Diagram 5). Draw a line from this point through points 5, 6, 7, 8, and 9.

Apply the increase 3-16 for sizes from 36 to 42 at 5, as on the back part, and the decrease below 5 for sizes from 36 to 32.

As points 6, 8, and 9 are to parallel the same measurement is applied to them.

On the breast line measure out ¼ inch for each size, and at bottom ¼ inch.

This completes the fore part, and the grade is now complete from 32 to 42.

If sizes larger than 42 or less than 32 are desired, continue the grade in the same manner, but applying the measurements given in the table for these sizes.

Above 48 breast the increase on the back part is 1-16 inch **for top of back only.** No increase is made therefore at 2, 3, and 4.

This completes the grade, and we now have a perfect chart of all the sizes.

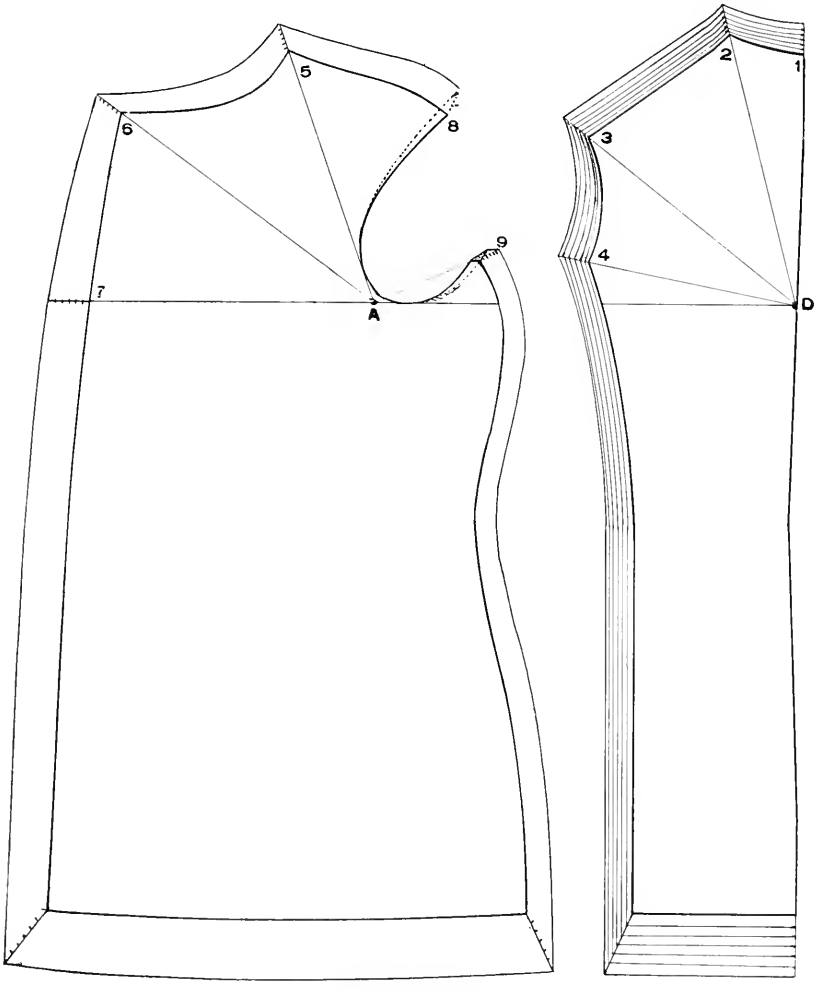


Diagram 45.

Now lay the chart on paper and prick through at each point for the 37 size. Remove the chart, and taking the original model for a shaper, outline the pattern from point to point and cut.

By this method the entire set of patterns when completed will have the same shape as the model, the other sizes being produced in the same manner.

THE SLEEVE.

DIAGRAM 46.

Draft the sleeve as directed in Diagram 9.

E and G are the grading points.

Draw a line from E through A on the outside sleeve.

Apply the increase, 3-16 inch for each size beyond A for sizes above 36, and below A for sizes under 36.

Now draw a line from G to the outside point beyond A.

On this line measure out from G marking for each size 3-16 the same as beyond A.

Now sweep from each point beyond A, using the corresponding point near G as a pivot. This gives the proper top line.

Draw a line from G through K at the bottom and extend the in seam line a similar amount below L.

Apply the increase below K and L on these lines as indicated in the table which is ¼ inch, and above K and L of course for the smaller sizes.

Shape the outside sleeve line for each size parallel with the model or use the grade sheet as a chart and prick through for each size, as directed for coats.

The under arm sleeve is obtained in a similar manner.

Draw a line from E through I.

The increase beyond I (3-16) is applied on this line. Draw a line from G through K and extend the in seam line below L.

Apply the increase ¼ inch on these lines and shape as represented.

SHIRTS.

The grading point on the shirt is point B of the draft. See Diagram 27.

Draw a line from this point through A, L, K, T, Q and S of the back part, and D, I, J, N and P of the fore part.

Apply the increase as given in the table, ¼ inch at A on the back part.

Duplicate this at L, K, T and Q, as all points are parallel up to 48 breast.

Beyond 48 the increase is only 3-16 inch, while on the breast line it is ¼ inch.

For the fore part the increase at the shoulder points I and J is ¼ inch, but on the front line at D is ⅛ inch, on all sizes from 36 to 48.

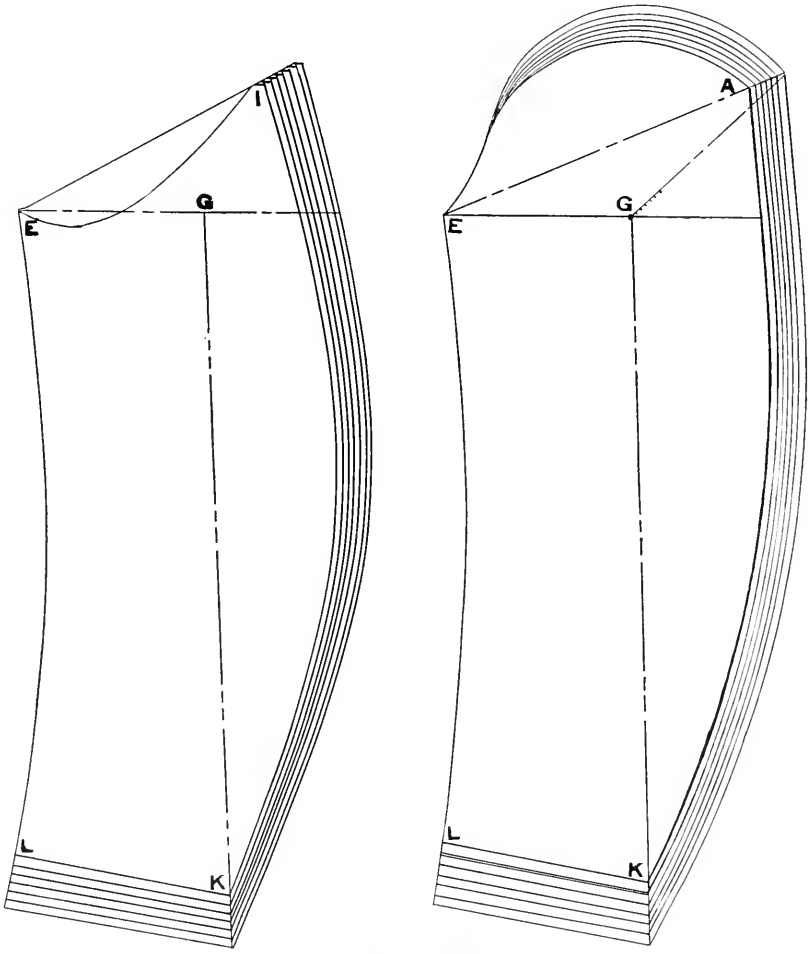


Diagram 16.

Above 48 the increase at D is reduced to 1-16th, while below 36 or from 36 down to 24 the decrease at D is 3-16 inch.

From 36 up the length is usually the same on all sizes, but from 36 down should be shortened at least ½ inch for each size. The increase on both back and front at the waist line is the same as the breast, ¼ inch for all sizes except above 48.

Above this size the waist is usually larger than the breast, hence 2-3 of this excessive waist measure should be applied to the front at E and 1-3 at P, on the fore part.

JACKETS.

Since the jacket is drafted on the principle of the shirt the grade is the same, using point B as the grading point for the back part and G on the fore part, grading from a 36 size.

KNICKERBOCKERS...

DIAGRAMS 47-48.

Draft a size 8 as per Diagram 23.

Measure in on the fore part from 1 to 2, 1-6 seat, and square down to the seat line.

Now draw a line from point A through the two points at top of fore part as lines B and C.

The increase in rise is ¼ inch for each size.

Extend the seat line and apply the increase ⅛ inch on each side.

Square down from A for center line of front.

Apply the increase in length ¾ inch for each size on this line, and square each way from this line at each point.

Apply the bottom measure for the largest size, placing ¼ bottom from center line to 5 and ¼ bottom plus ¾ inch from center line to 6 and draw a line from 5 to 3 and 6 to 4.

Use the grade sheet as a chart and prick through at each point for each size.

Draft the back part in the usual way and draw a line from grading point A through the two upper points of the back, extending the seat line and center line as shown in the Diagram.

Apply the increase the same as in the fore part and shape.

The pant is finished with a strap at bottom by laying two small pleats each in both back and front or by taking out a V 1 inch wide at the center line in both back and front, making the dart seam 2½ inches long.

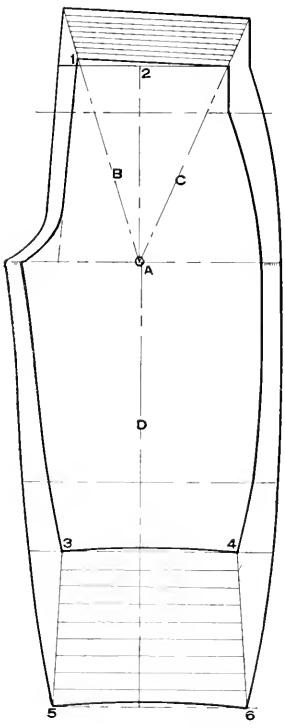


Diagram 47.

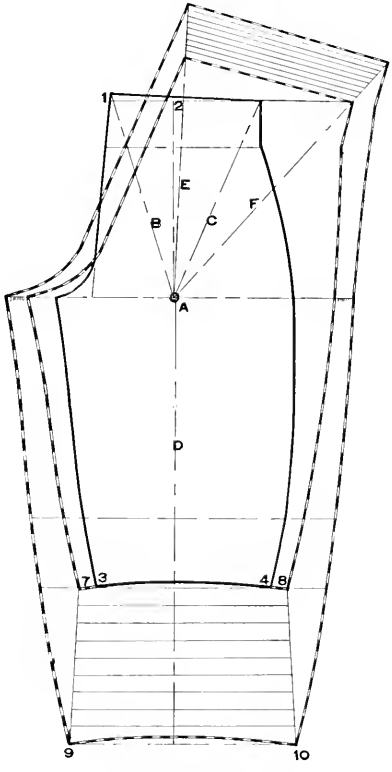


Diagram 48.

TROUSERS.
DIAGRAMS 49-50.

The best grading size for trousers is a 30 waist. Using size 30 for a model measure in on the fore part at the waist 1-6 seat from K, and square down. Now measure down from 6, ½ waist for point 7, and 2 inches for 8. Draw a grading line from 7 through I and K and extend the seat line at G and B.

Now place the square with point 15 on scale of halves at 6 and mark at the corresponding number for each waist size on same scale for depth of waist or rise.

For a 32 mark at 16, a 34 at 17, 36 at 18, etc.; this will give the correct rise.

Square each way from these points and the intersection of these lines with the grading lines above K and I will give the correct waist size. The increase on the seat line at both G and B is ⅛ inch.

Now place the fore part on paper and draft a 30 back, as per Diagram 20.

After completing the draft draw a line from the grading point 7 through point 1 and from 8 through point 2.

Apply the same increase at top of back as on front and both the rise and waist sizes will be correct.

The increase on the seat line at both S and R is ⅛th.

For 35 and 36 lengths, however, the rise should be increased, as increased height means also increased depth of waist.

Draw a line from 3 down through Q and apply the increase in length on this line. Place one-fourth bottom each way from this line for bottom of largest size and draw a disproportionate grading line from these points to the points at bottom of model.

This will regulate the size of the bottom on the intervening sizes.

OVERALLS.

For the two seam overall the same rule and the same increase applies as on trousers.

For the one seam overall, however, the best policy is to draft the largest and smallest size, placing the one upon the other so that the outlines parallel, with an equal distance between the points and grade by the usual method of spacing.

This pattern being a union of the two parts, front and back, it would be difficult to grade from any given point without producing a disproportionate pattern.

LEGGINGS.

Leggings are graded by extending the cross lines at ankle, knee and bottom. The increase both front and back for full sizes is ¼ inch, and for half sizes ⅛th.

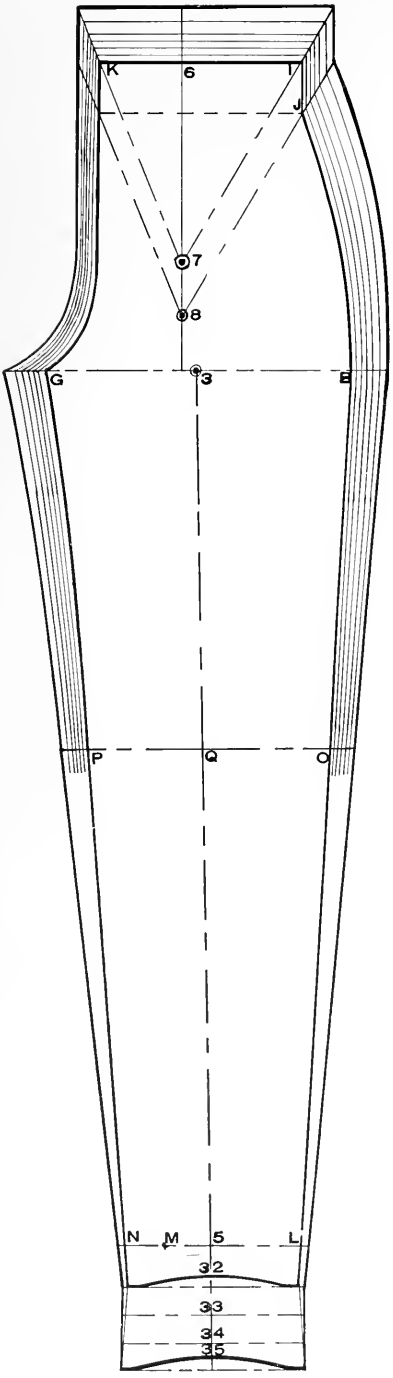


Diagram 49.

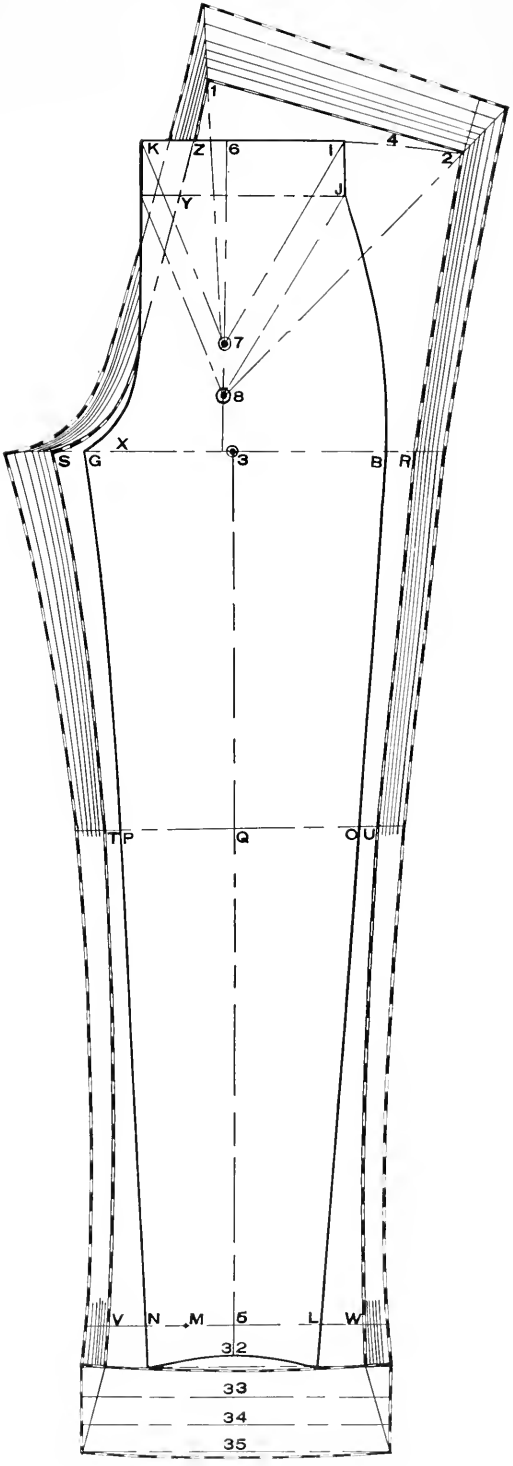


Diagram 50.

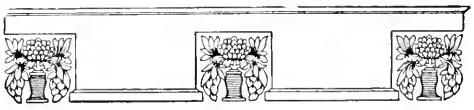
GENERAL REMARKS.

Grading is not only permissable but advisable, for by this means a set of patterns can be made more uniform than by drafting each size, and with less danger of error.

In grading a set of patterns, however, one should be extremely careful and accurate both in the original draft and in the location of the grading points.

Unless the grade chart is perfect the patterns will be imperfect, and too much caution can not be used in this respect.

Even after cutting the patterns it is well to place them one upon the other with the largest underneath and ranging upwards to the least, and compare their relative proportion.



ECONOMY IN CUTTING.

How to economize is an ever present problem with the manufacturer. Keen competition makes it so.

To the cutter is given the responsibility of exercising the proper economy in cutting up the vast amount of materials consumed in the average factory.

Much of the profit is made or lost on the cutting table. The cutter therefore should feel this responsibility and exercise the utmost judgment in cutting. Likewise the firm should respect the responsibilities of the cutter and remember that while he is expected to use the least possible amount of material, he is also expected to produce good full garments, beside which the matter of yardage, though important, should be of secondary consideration.

Actual economy in cutting is the production of good full garments from as little cloth as possible, and yet, actual economy in manufacturing does not hinge solely on the amount of material consumed.

Cutters who are familiar with the details of manufacturing in the work room are fully aware that the saving of cloth in cutting by an elaborate piecing process is sometimes more expensive than to eliminate the piecing and use more cloth.

Especially is this true on cheap fabrics, and the cutter, or rather the one in authority, will do well to compare the actual amount saved in cutting, by the piecing process, with the actual cost of getting those pieces sewed on again.

Labor is one of the largest items of expense in manufacturing of any description, and the manufacture of clothing is no exception.

Every seam in the garment costs money, whether the basis is time work or piece work.

If, as in most cases, the cutting and sewing room are operated as separate and distinct departments, the cutter is prone to think that every tub stands on its own bottom, that it is his particular duty to economize in material, whether by piecing or otherwise, and if the expense of make-up in the other department is greater than the amount actually saved by piecing, it may be the firm's misfortune, but it is not his fault.

The amount saved by piecing is figured in yards and inches and easily calculated. The amount lost in make-up is divided between the actual cost of the operation of sewing the pieces on, the decrease in production, the cost of ripping and fixing when the pieces are improperly joined as is frequently the case with the average help, the loss in re-cutting the small pieces that are occasionally lost, the number of twisted, awry garments as a result of improper joining of pieces, etc., etc., which makes an accurate estimate of the loss difficult.

In custom cutting of course the balance is in favor of piecing whenever saving of material can be made. In manufacturing, especially on the cheaper fabrics, it is up to the person in authority to determine when it will save and when it does not.

While it is neither possible or necessary to eliminate piecing entirely from factory work, such piecing as is permitted should be uniform in order to simplify as much as possible the process of make-up in the work room.

For instance, if the piece can be made a uniform size for all the various garments, the danger of mixing is eliminated.

If the two seam edges of the piece can be made the same length the danger of joining the wrong sides is removed.

Practically all of this can be arranged in the original draft of the garment or in the set of patterns, and to cut understandingly one should have a technical knowledge of the construction and draft of the garment.

While it may sound peculiar to suggest that the pattern or garment should be fitted to the cloth, yet this in a sense is true in manufacturing.

The cutter will find in almost every instance, after drafting the garment according to the correct style, and completing the grade of the set of patterns, that by laying the patterns on the cloth and making a thorough study of his layout he will be able to perfect a layout that will effect a saving of cloth, a piecing scheme, if necessary ,that will not be cumbersome or difficult in the work room, and perhaps alter his patterns slightly to admit of more advantageous cutting without affecting either the style or fullness of the garment.

In suits of course the styles are so varied that it would be difficult to give an illustration that would be of any special benefit.

TROUSERS.

In trousers, however, the layouts are more limited.

While the styles frequently change, and produce very different effects, the contour of the pattern remains practically the same, and the method of laying them varies but little.

The three systems illustrated and which are most commonly used, as known as the Five Front, the Four Front, and the Straight Lay.

Diagram 42.

The Five Front lay as a rule can only be used on the ordinary straight leg or tight leg trousers, or for youths' sizes, the fore parts on peg tops, mollies, or welt seam trousers, being too large to lay in this manner.

The front occupying the center position in this lay must, of course, be one of the smallest sizes, and those on the side the longest.

In cutting 12 to 18 sizes, ten sizes are grouped, placing the ten fronts in two groups of five each and laying the backs two and two, the remainder of the sizes, usually the largest, being laid straight lay fashion, with back and front together.

The advantage of this system is that one entire length is gained in the lay of ten sizes. The disadvantage is that the crotch on nearly every back and usually on the two center fronts must be pieced, unless on very wide goods.

Diagram 42.

Diagram 43.

Diagram 44.

The tendency of the mills to make wider goods, if continued, will increase the advantages of this system, as the 30 and 60 inch goods will admit of a very large pattern laid in this way.

At the present time, however, so many mills are clinging to the old width looms, that the conditions are almost as bad, if not worse, than before the change began.

Then the cutter had one width only to contend with. Now he has a variety of widths ranging all the way from 27 inch on narrow piece dyes, etc., to 31 and even 32 inch goods.

This gives him the double task of selecting his cloth both as to width and style of cut or make-up.

Diagram 43.

The Four Front lay therefore offers a very advantageous method since it admits of a larger pattern, and will therefore accommodate the large peg top, welt seam, or even molly patterns on the wide or ordinary goods, and the smaller styles on very narrow goods.

In this lay the fronts are laid with the smaller sizes on the side and the larger ones in the center, each two groups of four overlapping, as shown in the Diagram.

The backs are laid two and two as in the five front and require the same amount of piecing. The chief advantage of this layout over the five front lies in the fact that it will admit of a larger pattern for the same width fabric, and that instead of being limited to one or two groups, or to ten or twenty sizes, every four sizes can be grouped throughout the lay.

In cutting 16 sizes therefore it is possible to group the entire lay, whereas in the five front only ten sizes could be grouped.

Of course it would be possible in the five front to group 15 sizes, but it would require considerable extra work to cut the odd back.

Diagram 44.

The straight lay is doubtless the oldest in use and thought by many to be the best.

The scheme in this layout is to lay the longest, largest fronts with the least back and visa versa, letting the bottom of the front overlap behind the back of the adjoining size.

Whatever may be said for or against this method, it is certain that it requires little or no piecing, affords an easier method of working up short ends, and if the pattern is properly cut for this lay, it will lay better on the stripe, and nearly if not quite as little yardage as either of the other two.

For this lay the front should be cut as small at the bottom as possible to not injure the appearance of the garment, but one distinct advantage is that it does not require the back to be straightened as is frequently done by cutters who favor the other two layouts.

For single width, or 28 to 30 inch goods it is equal to either of the other two methods if properly used. Of course in wide goods (double width) much depends on the style of the garment and width of the

fabric, as in some cases it is an advantage to open out the wide goods while in others it is not.

In some plants where the practice of opening out the wide goods is continually followed, the center crease is pressed out and the goods rolled on long wooden rollers. This is usually done by the sponger.

As has been stated, the cutter will find that by placing his patterns on the cloth he will discover slight changes that can be made in the pattern that will greatly reduce the yardage and at the same time not affect the style or fullness of the garment. For instance, the bottom of the front may be slightly reduced and the amount added to the back, but if this is done it should not all be removed from the same side of the front or all added to one side of the back, for this will result in a twisted garment. In making such changes an equal amount must be removed or added to both sides of the pattern. If you should take ¼ inch from the in seam edge of the front and add it to the out seam edge of the back it will result in a badly twisted garment, yet cutters in reducing or enlarging on a pattern or in marking frequently make this mistake.

On the other hand, if you take ¼ inch from the in-seam of the front and add to the in seam of the back, the out seam will hang correctly, but the in seam will be too far forward.

In reducing the leg size on a pattern the same rule applies. If for instance the reduction is to be ½ inch and you remove ¼ from the in seam of the front and ¼ from the in seam of the back you have increased the width of the stride.

If it is found necessary to straighten the back it should be done in the draft by making the distance from J to V 1-3 seat plus ¼ or ½ inch or whatever amount is necessary to give the back the desired pitch. (See Diagram 19-20).

If a very straight back is desired the two seam overall draft in Diagram 36 may be found advantageous.

KNICKERBOCKERS AND KNEES.

Boys' pant patterns are so small and the width of goods so variable that it would be impossible to give an illustration that would be of any benefit. The yardage, however, should range from 14 to 17 yards per donzen on Knickers and 10 to 12 yards on Knees, owing to the widih of goods.

OVERALLS.

The lay out on two seam overalls and in fact all overalls, is very simple, the size of the pattern making grouping impossible, and the only real skill required is in the lay of the trimmings.

In this class of work more than any other perhaps, does the lay out affect the draft. The goods is of a cheap grade, competition is keen, and the cutter must utilize every inch of cloth to the very best advantage.

The drafts given in Diagram 35-36 and 37 are of the very best for economical cutting.

One method of economizing in cutting the standard apron or bib overall is to cut the inner facings, such as the front waist band, the top bib facing, etc., from a cheaper material. The best grade Denims are worth usually 12 to 14 cents. If these trimmings are cut from a cheaper fabric, say 7 cents, the actual yardage on the Denim of say a regular 40 yard garment will be reduced to 36 yards.

If four yards are used for the trimmings in the cheaper fabric the cost is reduced one-half, which is equivalent to saving two yards per dozen of the regular fabric.

The buckle straps and flys may be cut the same as trouser flys and lined. Selicia is cheaper than high grade Denim. Even the back waist band may be cut single and lined with the same material as is used for the front band and bib facing.

Brown drill is suitable and good, and as the pockets are made of the same material, the interior of the garment has the same white finish throughout and presents a neat appearance.

This also relieves the thickness at the seams and buttoning points, and if the ordinary brown drill is not desired it is an easy matter to have it dyed.

The one seam overall is laid very much the same as the two seam except where the bib is cut on, in which case the width of the goods and the lay of the pattern must figure largely in the draft.

On this garment the bib of one should fit down behind the back of the other size, and as this garment must be finished with a button hole facing at the side the front can be cut narrower than for the other styles.

SHIRTS.

In shirts, as in overalls, the size of the pattern makes the lay out very simple so far as the shirt itself is concerned, but the skill required is in the lay of the trimmings.

On some goods, however, considerable advantage is gained in piecing the sleeves, but the piecing should be uniform for convenience in the work room.

A cutter of meagre exerpience on shirts should be careful of the shoulder points, front opening and facings, otherwise he will have some twisted collars.

Also in making up the shirt care must be taken in facing the front, to have the turned edge of the facings equally divided on each side of the seam edge or opening line of the shirt or a twisted front or collar will result.

The collar band for the shirt may be cut straight, but the better way is to shape it as shown in the lower part of the turn down collar in diagram.

PART TWO.

MANUFACTURING.

INTRODUCTORY.

Since this is perhaps the first book ever published, intended expressly for, and confining itself entirely to the Clothing Manufacturing Industry, or possibly the first book in which the subject of Clothing Manufacturing has been discussed at all, a few prefatory remarks as to the contents of this part of the book will not be out of place.

The book as a whole is written in the interest of those engaged in the Clothing Industry, and is therefore intended to benefit every man so identified who desires to acquire all the knowledge obtainable concerning the business in which he is chiefly interested, whether it be the small salaried cutter's assistant or apprentice striving for advancement, or the self-confident manager who feels that he has the most perfect organization in the world.

It is not by any means assumed that this book contains all of the fundamental principles of clothing manufacture—far from it—but the subjects touched upon, and the treatment accorded each, are worthy of the attention of the best.

Comparisons are usually beneficial. It is always worth while to know what means the other fellow uses to obtain the same results, hence Part Two of this book explaining the best systems used by our leading manufacturers, coupled with practical hints, suggestions and facts, gathered here and there in the trade, representing the essence of years of experience, should be of interest to each and every reader regardless of his ability, while to the younger element growing up in the trade it will be equal to years of practical experience.

SYSTEM.

System is the balance wheel of industry. Without system all would be chaos. Yet in all branches of manufacturing we see occasional evidences of utter indifference to system, or a degree of ignorance equally as bad. The clothing industry is no exception, and ranging upward from the crude, indifferent work-shop to the large systematic factory may be observed all the various stages of factory organization.

A system is not perfect unless it operates automatically. The eyes of the superintendent nor even his assistants can not be everywhere. The system must operate for them.

In many places where system is attempted it is overdone. It is made both complex and cumbersome.

A system to be effective must be simple enough to be understood by each and every operative. It must begin with the laying up of the cloth in the cutting room and never cease until it delivers the completed garment to the stock room, indicating the duties of each and every operator in its line of progress, clearly and distinctly, keep an accurate account of the labor performed by each, keep the various units of work properly assembled during the process, and deliver to the office an accurate account of its travels and expenses.

The first part of a system to be considered is the method of handling the work.

In practically all factories the work is handled by one or the other of the four following ways:

1st. The "complete" or one-handling process, wherein the garment is completed by one operator.

2nd. The "two-handling" process, one operator doing all perhaps but the seaming or finger work.

3rd. Team work, in which the work is handled by a team of usually ten or more operators, each performing a small part of the work.

4th. "Section work," in which the work is divided into classes or sections, each performed by a different set of operators.

The first two have been practically eliminated by the remarkable advancement in the construction of special machines for clothing manufacture in the past few years, which has made divisional work of some sort almost imperative on practically every style of garments made.

To properly systematize the work for the two latter processes is a problem that is constantly presenting itself for solution, for scarcely a year passes which does not present some new mechanical creation which revolutionizes the process of manufacture and requires a complete revision of the system.

Formerly all classes of garments were made by the "complete" or one-handling process, each operator completing the garment with the exception perhaps of button holes and buttons, but as the number of special machines increased, divisional work was adopted because of

the impracticability of sending the work to the specials and back to the original operator again. Some few, however, still endeavor to harmonize the old method with their modern improvements and transport the work from the original operator to the special and back again, time and again during the completion of the garment.

While the methods known as "team work" and "section work" are perhaps the best that have been devised to meet modern conditions, they are not without their weak points.

The principle difficulties to be overcome by any system are (1) the irregularity of help (especially female), (2) the varying capacity of operators, and (3) the care of the work in process so as to avoid loss of trimmings or mixing of shades and sizes.

In team work each team consists of a certain number of operators, usually ten or more, occupying adjoining machines, and passing the work from one to the other one garment at a time.

Obviously, in this system the irregularity of help would be quite a factor, as, in the absence of one or more operators on a team, a substitute must be supplied for the vacancy or the whole team is disorganized.

The process of work, however, on the "team" system is usually rapid, the theory being the same as in all divisional work, that an operator can become more efficient, and in less time, on a small portion of the work than on the whole of it.

The principle disadvantage in team work lies in the fact that the absence of a single operator completely disrupts the team unless a substitute can be provided, which is often times impossible.

This one disadvantage should be sufficient to cause the complete abandonment of team work, for any system to be successful and economical, must be so arranged that each division may be operated (for a reasonable time at least) independent of the rest, and must be sufficiently elastic to admit of slight changes, either from change in make-up, or the introduction of new machinery, without disorganizing the balance of the system.

It is not claimed for "section work" that it is the one and only system by which clothing should be manufactured. No system is perfect. All have their evils, but in choosing evils it is wise to choose the lesser.

In "section work" each division or section operates independent of the rest. Not entirely so, of course, but no one operator is dependent upon another, piece by piece, for his work, and each division is independent of the rest to the extent that a break-down, shortage of help, or other delay to the work is not felt by the other divisions for a reasonable length of time.

The problem in any sort of divisional work is to keep the work properly balanced so that it will not accumulate at one point and run short at another.

The one distinct advantage that section work has over team work in this respect is that in team work the balance depends on the effic-

iency of the operator ,while in section work it depends upon the number of operators on each section.

Obviously it is easier to control the number of operators than it is to control the efficiency of the individual operator.

Again, in making up different styles of garments there are some parts of the work that would be eliminated altogether on some grades.

In the team the operator performing that part of the work would be temporarily out of a job, while in section work enough of each grade could be kept going to keep all hands busy.

It would be practically impossible to prescribe a division in the work that would be applicable to each and every style or class of garments, but there are some general rules to be observed by which most any one can successfully arrange their own work to suit their own needs.

1st. No special machine should be used that requires an extra division of the work unless some distinct advantage either in speed or workmanship is to be gained by its use.

2nd. Make no division in the work except such as are necessary to admit or accommodate the special machines used.

3rd. Embody as much work as possible in each section and in no case have the work handled by the same operator twice.

4th. Have the general arrangement of the work room and equipment conform as much as possible to the working system so that the work will travel from point to point in logical order.

5th. Harmonize the differences of make-up of the various grades as far as possible so as to limit the variations in the actual work performed by each operator on the various grades or styles.

6th. Assemble all the minor parts of the garment at as early a stage as possible to avoid loss or mixing of parts or sizes.

7th. Simplify and condense everything in connection with the system in the greatest possible degree.

An example of one of the most effective systems of section work on trousers, and the special machines used in connection therewith is as follows:

1st—Special. Belt straps (and buckle straps).

2nd—Special. Serger or zigzag.

3rd—Special. Making trimmings (pockets, flys, and put on straps).

4th—Special. Cutting back and watch pockets (two needle pocket cutter).

5th—Special. Buttonholes in flys.

6th—Ordinary. Putting in pockets, put on flys.

7th—Ordinary. Out seam, cord, canvas, back seam, and belt straps.

8th—Special. Pocket serger or trimmer.

9th—Special. Staying pockets.

10th—Special. Waist buttons.

11th—Ordinary. Waist lining and stitch down fly.

12th—Press. Waist and back seam.

13th—Special or Ordinary. Join fronts and in seam.

14th—Special. Fly buttons.
15th—Special. Stay fronts.
16th—Inspection of machine work.
17th—Press in seams (and out seams if not corded).
18th—Handwork (if any).
19th—Hem bottoms (either blind stitch or basting).
20th—Press bottoms.
21st—Press off.
22nd—Final inspection.

While this may appear to be an elaborate division of the work, it will be observed that, after all, the bulk of the work is performed by only five sets of operators, the balance being done by specials, the second, fifth, sixth, eleventh and thirteenth operation constituting the real work, while all the rest is done by special machines. These five sections are usually numbered Sections 1, 2, 3, 4 and 5, as a matter of convenience in keeping the time, and the average capacity of operators on each section is as follows:

1st Section, 100 pair.
2nd Section, 65 pair.
3rd Section, 100 pair.
4th Section, 175 pair.
5th Section, 200 pair.

Which figures represent about three-fourths the average maintained by swift operators.

The work is tied in bundles in the cutting room, the trimmings being placed in the backs, and backs and fronts tied in separate bundles, the first section operators having no work to perform to the fronts are therefore spared the trouble of handling them at all. Both backs and fronts are tagged as will be explained under the head of Time-keeping, and are reunited by the pocket cutter, who performs the first work done to the fronts.

If the cutting room and sewing room are located on different floors or occupy different rooms, as is usually the case, and a surplus space exists in the cutting room sufficient to contain a small number of machines, the first five operations can be performed in the cutting room with considerable advantage, as only a comparatively small number of machines are required for this preliminary work.

In this way the belt straps, pocket flaps, and small accessories are made and put in the bundle before it leaves the cutting room, so that when it reaches the sewing room each bundle represents a complete unit of work upon which no further preliminaries are necessary.

Where the two-needle pocket cutting machine is not used the second, third and sixth operation are combined in one, but the flys and flaps should be made and button holes worked beforehand, as this causes more or less confusion in the work room in passing the button hole pieces to the machine and back and frequently causing the operatives to leave their machine when they should be at work.

It is a well known fact that the actual capacity of the various machines (both special and ordinary) greatly exceeds the average maintained by the operators. The reason lies in the fact that so much time is lost in transferring the work from point to point, in passing it from one point to another and back again, and in looking after the little accessories.

Time an operator on a dozen garments, or for a given length of time, during which no interruption is permitted, compare the result with the average of the same operator for a week or month, and the difference will be surprising.

It is not the purpose of this article to lay down a formula for the manufacture of each and every style of garment, but to outline a general plan of operation by which any plant may be systematized according to the most modern methods, regardless of the class of garments manufactured or the peculiar needs or conditions of the individual plant.

Trousers have been used as an example as representing an intermediate ground in the field of men's garments.

There are very few manufacturers of men's wear that do not make trousers or some similar garment, unless perhaps it is the exclusive shirt factories.

Likewise there are few who when given a perfect system on one class of garments can not work up an equally effective system on others.

Perhaps the most difficult plant of all to thoroughly systematize would be the one in which several distinct classes of garments are made, such as shirts, pants, overalls, jackets, and duck coats.

To this there is but one practical answer. Segregate them and systematize each according to its own needs. It is true that there are plants in operation, even small plants, in which this or an equal variety of garments are manufactured, but the highest degree of efficiency in each can never be attained until segregation of some sort takes place and a distinct system properly applied to each.

Even the ridiculous combination of skirts and pants has been attempted, but the man who undertakes to harmonize such a combination into a perfect working system has acquired something which he can safely calculate on bequeathing to succeeding generations without the slightest depreciation.

It is not meant, however, that complete segregation is necessary where two or more distinct classes of garments are manufactured in the same plant, but rather that each should operate through a separate and distinct channel and touch only where the same operation is common to both.

In other words, the same set of operatives can not work successfully on such garments as trousers and shirts. Trousers and overalls may be harmonized, shirts and jackets may be harmonized, but even then the same degree of efficiency can not be maintained as on one class alone.

Under the head of equipment and installation a logical method of arrangement for combinations of this sort will be discussed, but for the present our attention will be directed to the subject of

TIME KEEPING.

A good time keeping system is one of the most essential features of factory organization, since, in the majority of factories the work is conducted on the piece work basis.

The essentials of a time keeping system are simplicity and accuracy. It must conform to the method of handling the work, should be combined with the system for keeping trace of the work in operation, and should depend as little as possible upon the skill, memory, education, accuracy, or integrity of any individual. In other words, it should operate automatically in conjunction with the general system of operation of which it forms so important a part.

The cutting ticket and bundle tag have long been used by the best manufacturers as a means of identifying the various units of work in operation.

In most cases it is also used in connection with time keeping, the methods varying according to the needs or opinions of the various concerns, one of the best examples of which is herewith given.

To begin with, each employee is numbered, numbers being more convenient than names, the number of each being retained throughout the entire term of employment.

2nd. Each style of make-up is numbered, the make number also being permanent so long as that style of garment is made. The make number therefore indicates to the cutter how the garment is to be cut, indicates to each operator how each section of the work is to be performed, and indicates throughout the entire process, the price that is to be paid for each section of work.

3rd. Each fold or cutting is numbered in consecutive order, beginning either with the first of the year or the first of the season, and a cutting ticket is used for each individual cutting, whether it consist of one garment or one thousand, or more.

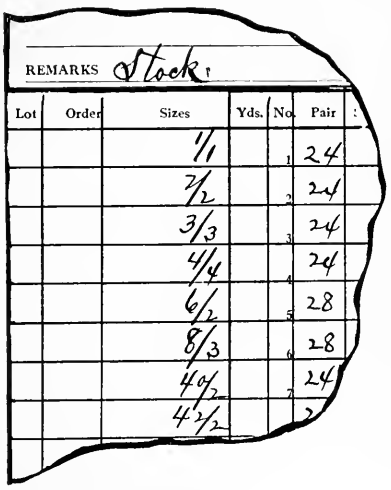
4th. Each bundle of work in each cutting is numbered so that when two or more bundles of the same size occur in a cutting they may be distinguished by the number.

Since the work originates in the cutting room, the system must be traced from that point, or properly, the cutting ticket should first emanate from the office or superintendent in the form of an order to the cutter, indicating the lot, style, or class of goods to be cut, the pattern to be used, the make number under which the garment is to be made, the grade of trimmings to be used (unless same is indicated by the make number) and whatever special instruction may be necessary, as to schedule of sizes, etc. Having cut the fold, the cutter inserts the sizes cut and the number of pair of each in the proper columns.

enters the total number of pair, and total yardage in the heading and delivers the ticket to the trimmer as a guide for trimming the fold.

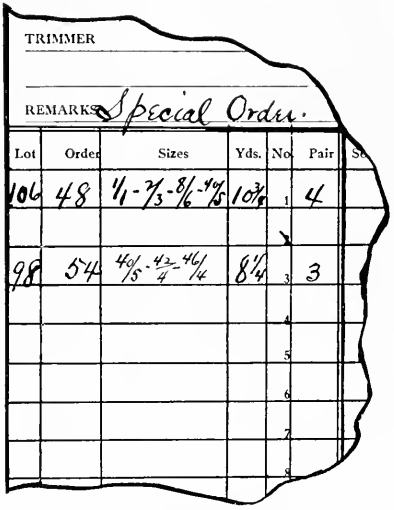
The form of cutting ticket shown on the following page can be used for a combination of trousers, overalls, jackets and shirts, the one form sufficing for all.

In this ticket are provided two different forms of entry of sizes, one for regular stock, the other for small special orders, the method of entering these being indicated below.


REMARKS Stock

Lot	Order	Sizes	Yds.	No.	Pair
		1/1		1	24
		2/2		2	24
		3/3		3	24
		4/4		4	24
		6/2		5	28
		8/3		6	28
		40/2		7	24
		42/2			2

Stock Ticket.


TRIMMER

REMARKS Special Order.

Lot	Order	Sizes	Yds.	No.	Pair	St.
106	48	1/1-7/3-8/6-9/5	10 3/8	1	4	
				2		
98	54	40/5-42/4-46/4	8 1/4	3	3	
				4		
				5		
				6		
				7		
				8		

Special Order.

The work on each class of garments is classified into five sections so that the section columns No. 1, 2, 3, 4, and 5, on the cutting sheet are applicable in the same manner to any class of garment entered on the sheet. The other columns are used for work of a similar nature on each class. For instance, the out seam column is used for out seam work on trousers and overalls, and side seams on shirts and jackets. The "hemming" column is used for hemming overalls and shirts, bottom basting on trousers, and bottom stitching on jackets. The "press" column for pressing on trousers, and folding on overalls, jackets, etc.

The bundle tag is usually filled out by the trimmer or ticket boy, one tag being used for each bundle, and should bear the cutting number, bundle number, make number, size and number of pair contained in the bundle, the stubs at the bottom of the tag being filled out in duplicate and used on fronts, sleeves, belt straps, flys, or any small parts of the garment that are not rolled up in the main bundle of work.

In some cases, however, an ingenious combination of the make number and bundle number has been effected in the following manner: The make numbers are confined to even hundreds or fifties, as say 100, 150, 200, 250, 300, 350 and so on, and is combined with the bundle number.

GOODS Corduroy 90.
PATTERN A
MAKE NO. 1
NO. PAIR 436
CUTTER Jones.
TRIMMER Smith.
REMARKS Substitute Tabs for flaps

CUTTING TICKET

NO. 86

Date Dec 4, 1910.

WORK	NO.	QUANTITY			
STRAPS					
SERGING					
B. H.					
STAY P.					
W. SEAMS					
TAPE					
STAY F					
SEAM P.					

Lot	Order	Sizes	Yds.	No.	Pair	Sec. 1	P. C.	Sec. 2	Out Seam	Cord	Sec. 3	Sec. 4	Sec. 5	Knee Bands	Insp	H. W	Rubber	Press B'tt'm	Thr'd	Press	Reed
		2/1		1	24																
		2/2		2	24	32	16	18													
		2/3		3	24	23	16														
		3/2		4	24	2															
		3/3		5	24																
		4/1		6	24	29	16	47													
		4/2		7	24	4															
		4/3		8	24																
		4/4		9	24	32	16	47													
		4/5		10	24																
		6/2		11	24	6															
		6/3		12	24																
		6/4		13	24	29	16	47													
		8/2		14	24																
		8/3		15	24																
		4½		16	26	32	16	47													
		4½		17	26																
		4½		18	24																
		2/2		19	2																
				20																	
				21																	
				22																	
				23																	
				24																	
				25																	
				26																	
				27																	

Fold No. 86 Date Dec 4 1910

LOT AND YARDS

| | | | | | | | | | | | | | | | | |

Fold 86 Bdl. 2 Pair 24

Sce. 1 32 Size 2/2

P. C. 16

Sec. 2 18

Sec. 3

Stay

Sec, 4

Sec. 5

Knee B.

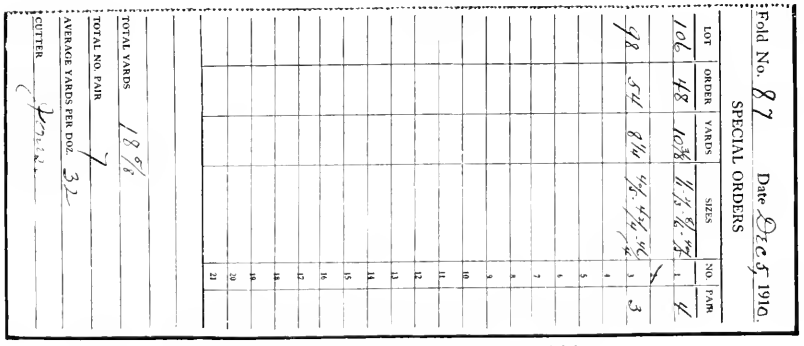
H. W.

Rubber

Threads

Press

Bundle Tag.



Cutting Ticket Stub—Reverse Side.

Where the make number is 300, the first bundle would be 301, the second 302, the third 303, and so on up to 325, 330, or as high as is necessary for the number of bundles in the cutting.

If the make number is 250, the numbers run 251, 252, 253, and so on. The first part of the number indicates the make, the grade, and the price paid for work, while the last part indicates the number of the bundle in the cutting.

When the work is properly rolled and tagged it is sent to the work room and the cutting ticket returned to the office, the superintendent, or whoever keeps the time, which brings us down to the real subject of time keeping.

On the opposite page is shown two very simple time cards; both are exactly alike with the exception of the day at the head of each column, the footing and color of the card.

At the top is a space for the date on which the week ends and for the number of the operator, no name at all appearing on the card. Just below it is a space for the section number, or the kind of work, if not a regular section, such as button holes, buttons, etc.

Each card is divided into three day columns, one card being for Friday, Monday and Wednesday ,the other for Saturday, Tuesday and Thursday, hence it will be seen that there are two cards for the week to each operator, and are used alternately.

At the top of each day column is a space for the time in and time out, each operator being required to obtain the card on entering the shop in the morning and turn it in on leaving, whether a day or piece hand.

Below this are three columns, for cutting number, bundle number, and number of pair.

The time therefore is virtually kept by the operator as it requires but a moment to copy from the bundle tag, the cutting number, bundle number and number of pair, hence no time keeper is actually needed.

On the cutting ticket will be observed a column for each and every part of work done to the garment.

The time cards being turned in at night and the opposite set issued the next day, the work for the preceding day can be checked up at leisure on the cutting sheet, by entering the number of the operator in the proper section column, opposite the number of the bundle given, a task requiring about one hour for each one hundred hands, including footing up the day column on the cards and specifying the price of each kind of work, which it will be observed, is indicated by the combined make number and bundle number entered in the center column.

The advantages of this plan are manifold.

In the first place, the cutting sheet furnishes a complete condensed record of the entire progress of the work from start to finish. It requires but one cutting sheet to each cutting of say 600 to 1,000 pair, one tag to each bundle of from 12 to 40 pair, and two simple time cards per week to each operator.

It furnishes a record of the daily production of each operator.

No. 32 TIME CARD A

Week Ending Dec 9, 1910.

Sec. 1 Work

FRIDAY			MONDAY			WEDNESDAY		
IN 7 OUT 5-30			IN OUT			IN OUT		
Fold	Bdl. No.	Pair	Fold	Bdl. No.	Pair	Fold	Bdl. No.	Pair
86	2	24						
86	9	24						
86	16	24						
Hrs.		72	Hrs.			Hrs.		
72 Pr. @ 150		108	Pr. @			Pr @		
" "			" "			" "		
" "			" "			" "		
" "			" "			" "		
TOTAL $			TOTAL $			TOTAL $		

NOTICE—Do oot fold, crumple or loose your time cards. Keep them cleao.

No. 47 TIME CARD B

Week Ending Dec 9, 1910

Sec. 2. Work

SATURDAY			TUESDAY			THURSDAY		
IN 7 OUT 4			IN OUT			IN OUT		
Fold	Bdl. No.	Pair	Fold	Bdl. No.	Pair	Fold	Bdl. No.	Pair
86	9	24						
86	13	24						
86	6	24						
86	16	24						
Hrs.		96	Hrs.			Hrs		
Pr. @			Pr. @			Pr. @		
96 " " 140		134	" "			" "		
" "			" "			" "		
" "			" "			" "		
TOTAL			TOTAL $			TOTAL		

If incorrect advise at once.
AMT. FORWARD, $ AMT. DUE, $

whether day or piece, and traces correctly the progress of the work through the factory, as each day's checking shows the advancement of each cutting for the preceding day, and it indicates promptly any mix-up of sizes, or bundles that may and do occasionally occur in any factory. It is accurate, for no one item of work can be paid for twice if the work is properly checked on the cutting ticket, which is a very simple task, requiring only ordinary intelligence.

When the week end is reached the pay roll is quickly completed by arranging the two sets of cards in numerical order, and computing the footings of each day column, placing the amount due at the bottom of one of the cards, and no time book is really needed, the cards being filed for reference.

An excellent record of the weekly progress of work in the factory may also be kept in the office by using one of the cutting sheets and entering in each section column the total amount produced on that section during the week, which totals may be easily obtained from the time cards when making up the pay roll. This will also act as a check on the time keeper, as the amount paid for on each section should tally with the amount cut, and a single sheet will contain the record of several months' work.

An occasional perusal of the time cards will show the comparative ability of various operators, whether or not they are maintaining the average capacity desired, who comes late and who is prompt, and, many other items of interest to the management.

On the bundle tag should be provided a space for each operator to place his or her number opposite the section of work done, as a matter of convenience for the inspector in case the work is defective.

There are many other ways in which this system may be used to an advantage.

For instance, if it is desired to keep tab on the amount of thread used by each operator, the operator should be required to present the card to the trimmer, who will enter the thread on the card under the proper date. If any operator is thought to be using too much thread, or rather obtaining more than is used, the record on the time card will show it.

If garments disappear mysteriously or continuously or any thing else goes wrong with the work it can soon be traced to the proper party by requesting the help to notify the management promptly when any shortage or irregularity is discovered. When this is reported a complete copy should be made of the tag accompanying the bundle of work, including the number of each operator who has handled it. A few copies of this kind will show the number of the guilty party appears on each tag while all the other numbers are changed.

A very effective cost system may also be worked up on this system, by having the day hands or time workers enter their work by hours instead of garments.

For instance, when a cutting is started through the shop the cutter should enter on his card the cutting number and the time required to cut it, the trimmer enters the time required to trim it, the button sewer, button hole operator, inspector and all day operators the same. When the work is checked up in the cutting ticket, the time of the various day operators is entered thereon from the time cards, and when the cutting is completed the actual cost of the entire cutting may be computed to a cent.

For this method the cards for the day hands should be somewhat different than for the piece hands, which can easily be adjusted by inserting the words "time on" instead of "Bdl. No." and "time off" instead of "pair."

The operator then will enter the cutting or fold number and the time when work is begun on the cutting, and when the work is finished he will again enter the cutting or fold number and the time the cutting is completed, whether it be the same day or the following day.

While this will of course require more work on the part of the time keeper, it will produce an accurate statement of the cost of each cutting, and it will prevent all idling of day operators, keep their production right up to the standard at all times and practically removes all element of doubt as to the cost of work in process, which many firms do not know until the inventory is taken.

There is also a detachable stub to the cutting ticket for the cutter's report, which contains a form on one side for regular stock and on the other for special orders.

At the top is filled in the fold or cutting number and date. In the box heading is placed the various lot numbers contained in the cutting. In the columns are placed the piece yardage, the net yardage being footed up at the bottom. Beneath this is placed the number of garments cut from each lot, and the totals for the cutting footed up below.

The opposite side is for specials, and is filled in the same as the large sheet, as shown in sample entry for Special Orders, page 101.

This slip is detached and sent to the office as soon as the cutting is completed. In this manner the office is fully advised of the work done in the cutting room the amount and kind of goods cut, the lot numbers in work, etc.

On the next page is shown a very good card system for keeping tab on sales and purchases. The card is of the regular thumb index type about 7x11 inches, on the index of which is stamped the lot number, one card being used for each lot.

The heading contains the necessary forms, showing from whom purchased, price, terms, deliveries, etc.

On the left is columns in which to enter the amount received and yards cut, the remainder of the card contains five double columns representing each of the five months of the season.

In one column is entered the number of garments sold, which are taken from the orders received and entered under the month specified for delivery, each entry being added to the former entries, the bottom figures always showing the total sold for delivery in that month.

In the other column is entered the number of garments cut, so that, a glance at the card at any time will show the balance between the amount sold and amount cut.

This latter amount is taken from the detachable slip of the cutting ticket, as well as the yards used, and the slip is then turned over to the stock clerk, who holds same until the cutting is made up and delivered to him from the work room.

The card system, however, is used only for the actual styles placed in the line after the line is fully completed, and is not satisfactory as a purchase record.

For a purchase record there is nothing better or more convenient than the Handy Purchasing and Cost Book, which is specially designed for purchases of every kind in connection with the clothing industry, and is manufactured exclusively by us.

To describe the numerous systems, forms of cutting tickets, bundle tags, pay checks, etc., in use, would fill a very large volume, and at the same time would no more answer the purpose of this book than one simple system and set of forms.

What is really needed in any factory is one good, simple, working system, adaptable to the class of garments made and suited to the peculiar needs of the individual plant.

Of the many systems and forms with which we are familiar the one given is the simplest and best. With only slight modifications it can be adapted to every style of garment made, and the addition of other styles of garments to the line, or the introduction of new machinery will rarely, if ever, require any change in the system.

EQUIPMENT AND INSTALLATION.

The usual method of installing machines in a clothing factory is in long tables or rows, usually full length of the building, leaving perhaps an opening in the center, forming a box step over the shaft, belting to the table nearest the motive power, and thence across from one to the other, or swinging counter shaft overhead and belting down.

It is only of recent years that any deviation from this plan has been made and even today the vast majority of plants are so erected. It is the line of least resistance.

And yet the owner or manager of a plant so erected, provided it is of any considerable size, has only to walk into the work room and quietly watch the procession—the constant march of his employees carrying work to and fro, and compute the amount of time consumed in

Cost yd. | Their No. | Ordered

Bot. of | Name

Received				Cut					Sales				
Date	Width	Pcs.	Yards	Date	Fold	Yard	Pants	Ck.	MONTH	MONTH	MONTH	MONTH	MONTH

this process weekly, monthly or annually, to arrive at the conclusion that his plant is wrongly erected.

The clothing business has become an industry. It is no longer an over-grown tailor shop.

The main point to be considered in the erection of a manufacturing plant is expressed in one word—"convenience." Economy of time and labor, the one great item of expense in clothing manufacturing.

The cost of equipment comes but once in the life-time of a plant, the pay roll comes every week as long as the plant exists.

The introduction of so many special machines has multiplied the amount of handling required in the process of manufacture, and the only way in which the expense of handling can be kept from overbalancing the advantage gained by the specials, is by the establishment of a perfect working system by which the work is made to travel systematically, almost automatically, from point to point, i. e., that each operator or set of operators may, with the least possible time and energy, place the work convenient for the next operator or set of operators.

Chief among the features of modern equipment, especially where electric power is used, is that of individual motors; not individual motors for each machine, but individual motors for each table.

Of course the first cost on several small motors would be somewhat higher than one large one, but when one considers the cost of counter shafting, hangers, pulleys and belting, loss of power through the use of same, future damage from oil dripping boxes, overhead belts, etc., the additional cost is not so great after all, and one has only to get back to his A B C's and remember that the cost of installation comes but once, while the power bill arrives regularly every thirty days.

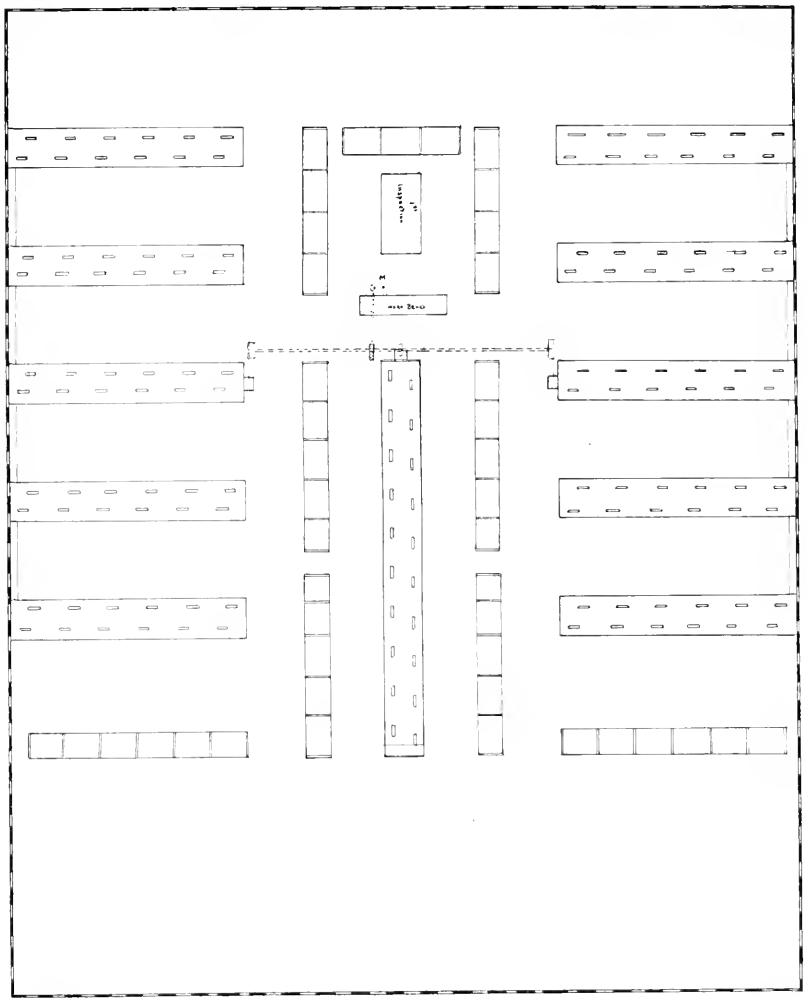
It must be borne in mind that in the operation of power sewing machines, about 80 per cent of the power is consumed in the operation of counter shafts, line shafts, and transmitters, while the other 20 per cent is applied direct to the machines. The saving of all this 80 per cent possible is worthy of careful consideration, and the installation of individual motors is a long step in that direction.

These, however, can not be connected direct to the shaft, because of the low speed required, the usual speed of the shafting being about 400 to 425 R. P. M., hence they will require belting.

In calculating the size of motor necessary to operate a given number of machines, the point of intermittence should be considered.

Machine people estimate about one-tenth horsepower to each machine, but it should be borne in mind that the larger the number of machines, the greater the degree of intermittence, and therefore a one-horsepower motor will easily operate 14 to 16 machines on one table, the main task being to drive the shafting and transmitters.

While it is obviously impossible to prescribe a plan of installation that would suit the location and requirements, or eliminate all of the difficulties that may be encountered in the erection or operation of a plant, a general idea of practical installation is given on page 111.



FLOOR PLAN.
Equipment, 140 Machines.

The sketch shows the floor plan of a moderately large plant, the equipment consisting of 140 machines, including all specials, and occupying a room 80x100 feet.

Short tables are used (containing 12 machines each) and are placed crossways of the room, five on each side, with ends to the wall. In the center, and lengthwise of the room, is a table containing 20 machines, all specials. On each side of this table is a row of racks or bins in which to deposit the work in process of manufacture, which are 30 inches wide, four feet long and about 16 inches from the floor, with high rails at each end, and are made to contain 600 to 800 garments each. Between the ends of the cross tables and the racks is an aisle of five to six feet in width, with about the same space between the special machine table and the racks.

The cross tables are spaced 12 feet apart from shaft to shaft, which leaves only about eight feet between the tables, or an aisle of about three to four feet between the chairs of the operators when seated.

Below the special machine table, toward the rear of the building, and center between the racks, is a table for the inspection of the work in the first stages. Between this and the machine table is the machinists bench, while at the upper end of the table, toward the front of the building, is the table for final inspection of the machine work.

In the remainder of the space at the front of the building is ample room for hand work, seam pressing, and such other pressing as is needed in the process of manufacture, but the final disposition of the garment, such as pressing, folding, final inspection, etc., would perhaps have to be done in another room or department unless a larger room was used or a less number of machines.

All this, however, depends upon the class of garments for which the plant is intended.

The drive is from one large motor suspended from the ceiling over the machinists bench, from which is driven a single (overhead) countershaft, placed crosswise of the building. From this is driven the special machine table in the center, and one of the short tables on each side, as shown in the sketch, the remaining tables being driven by belting across from one to another along the wall, the belting being boxed and therefore entirely out of the way. Thus it will be observed that all the belting and shaft obstructions are removed.

The main features of this plan are as follows:

1st. The work is all concentrated at one common, convenient center, in the midst of which are the machines that deal in volumes such as button machines, button hole, staying and all finishing machines.

2nd. The short table feature affords more "end spaces," which are especially desirable for the location of pocket cutters, pocket trimmers, seamers, and other specials, used in the regular process, which also handle large volumes of work and which, it will be observed, are also located convenient to the work center.

3rd. The short and direct route from any given machine to the work center.

4th. The opportunity afforded for specializing or segregating the various classes of work, and,

5th. The division of the plant into working units, which may be added to or diminished without disturbing the remainder.

It should be here remarked, however, that the proper power equipment for a plant of this type is individual motors for each table, the belt drive from a single power center being shown merely for the benefit of those who are forced, or prefer to use steam or other motive power requiring a belt drive, and it may also be stated that the plan is as practical for the small plant as for the large one.

If the work is handled on the "team work" basis the short tables are admirably adapted for this method, a complete team occupying each table, with perhaps one or two specials on the end.

The work should begin next to the wall and progress toward the end of the table, each team discharging its volume of work into the racks, whence it is to pass through the hands of the finishing operators to final completion.

If operated on the section work principle, the sections are arranged in logical order, from one end of the room to the other, the first section occupying the first table, the second section the second table, and perhaps the third, the third section occupying the fourth table, the fourth the fifth table, etc., the work beginning with the first section and traveling along the racks or work center as the work of each section is performed until finally completed by the finishing machines in the center.

The same principle applies in the manufacture of a combination of two or more classes of garments, and herein lies the principle of segregation mentioned on page 99.

If two classes of garments are made, as for instance trousers and overalls, one should occupy one side of the house and the other the opposite, the division applying to the finishing machines in the center as well as the ordinary equipment on each side.

If more than two classes are made, certain tables may be used for each, as for instance, one section for trousers, another for overalls, and another for shirts, or one sections for coats, another for vests, and another for trousers.

Supposing, for instance, the plant is intended for overalls and trousers in about equal proportion and each operated on the section work plan, as outlined on page 97.

Beginning at the rear of the building, on the trouser side, the first table would contain the first section operators with perhaps a serger (zigzag) and belt strap machine on the end. These would obtain their work from the end racks, where it had been delivered from the cutting room, and deposit it when finished in the first racks on their side.

The second table would contain second section operators with perhaps a pocket cutter (two needle) and a button hole machine (for flys) on the end. The pocket cutter would obtain the work deposited by the first section, and deposit it further up the line, ready for the second section.

The third table would also be occupied by additional second section operators, with a pocket trimmer on the end. On the fourth table would be the third section operators, each set of operators moving the work a little further up the line of racks or work center.

From the third section the work would be deposited in the line of racks directly behind the button machines and staying machines on the center table, who in turn would perform their work. Thence it would recross to the fourth section, waist seam presser, seamer, and back again to the center table, for fly buttons, blind stitch, etc., the finishing machines for the pants being placed on one side only of the center table, the opposite side being reserved for the finishing machines for overalls.

On the overalls the work would also begin at the rear of the building and in the same manner as the pants.

The arrangement of the sections, however, would be different, as would also the equipment, because on some grades of overalls, the first part of the work would be performed by single needle machines, and the second part by double needle, while on others the work would be reversed.

For this reason therefore the single needle operators should pass as first section, and the double needle as second section.

Two sections being sufficient for most of the overall work the term "third section" would apply only on those grades or styles on which a third operation is necessary.

Beginning therefore at the first table the equipment would consist entirely of single needle machines, for making suspenders, hemming and facing bibs, etc.

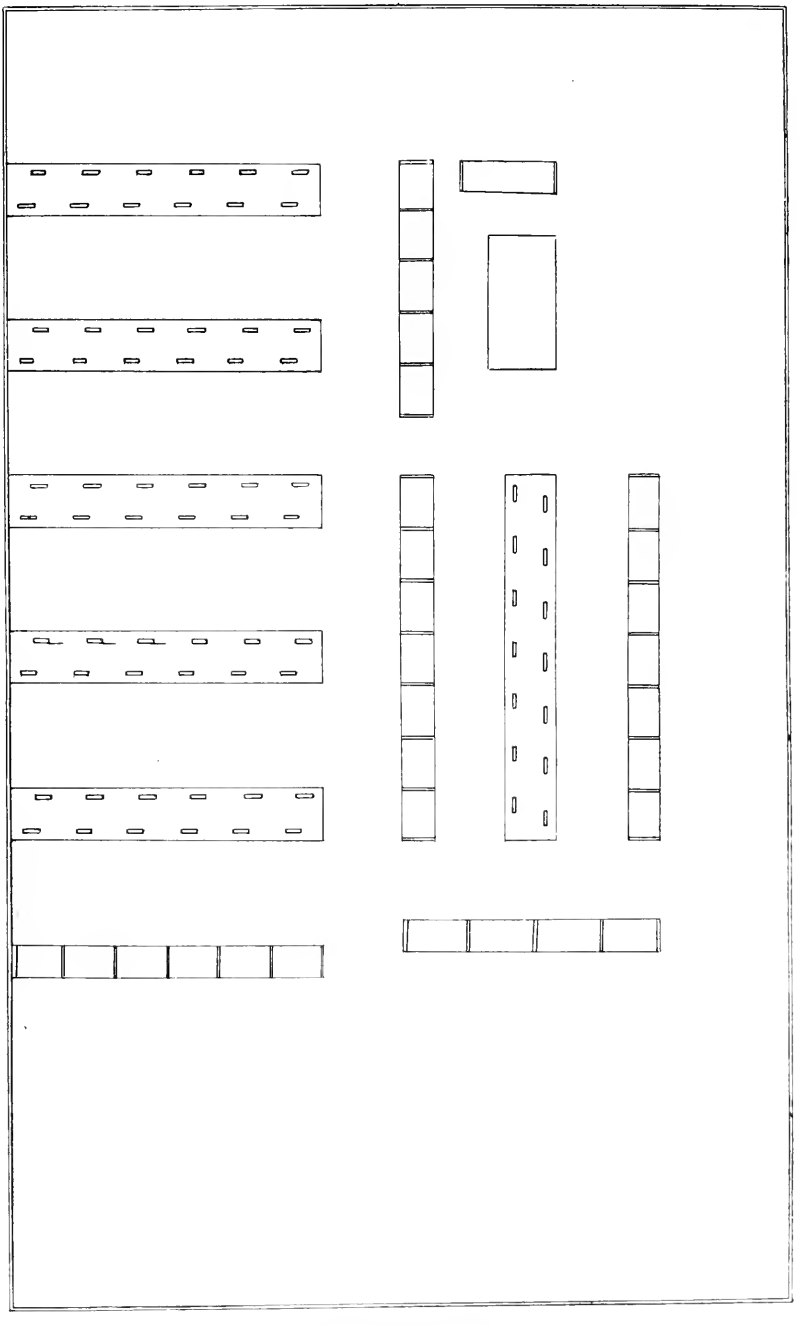
The second table would be the same.

The third and fourth tables would consist of double needle machines for the second section.

The fifth, of single needle machines for the third section, while on the special table would be the felling machines, sleeve machines, button hole, staying and button machines, and the work would progress in practically the same manner as on trousers.

The sketch of the plant, and the foregoing description of the plan of operation are sufficient to give a clear idea of the possibilities that may be worked out on this principle, and since the details must be worked out in each plant according to its own equipment, floor space, shape of building, class of garments made, etc., little more is necessary on the subject.

On page 115, however, is given a sketch of a smaller plant constructed on the same principle, the chief points of which, as has doubtless been observed, are the relative positions of the machine tables, the location of specials, and the centralization of the work in process.



FLOOR PLAN.
Equipment, 74 Machines.

SPECIAL MACHINES.

It has been remarked that special machines play an important part in modern clothing manufacture, and to those having in consideration the equipment of a new plant, or to those who have had no former experience with any of the specials named, the following may be of interest.

It should be here remarked, however, that the average capacity of machines given is the average capacity of the average operator and not the rated capacity of the machines.

Button hole machines, flys, etc., 3,000 button holes per day; waist bands, coats, etc., 1,200 to 1,800.

Serger (zigzag) on trousers, 250 to 300 pair per day.

Belt strap (for trousers) 1,800 pair per day.

Two needle pocket cutter (for trousers), 500 pair per day, cutting two back pockets and a watch pocket.

Pocket trimmer (over seaming), 600 pair per day of trousers, overalls, or similar work.

Chain stitch seamers (on trousers, etc.), 450 pair.

Union Special Felling Machine (joining overalls, shirts, etc.), one seam, 700 pair; two seams, 300 pair; sleeves for jackets, 300 pair.

Union Special Sleever (for putting in sleeves), 300 pair.

Staying Machines (for staying pockets, flys, etc.), average, 2,500 pockets per day, two stays to each; flys, 1,500 pair.

Taping Machine (for knee pants, etc), 800 pair per day.

Knee Band Machine, 350 pair per day.

Two Needle Machines (for flat stitching on overalls, shirts, jackets, etc.), pockets, 120 to 250 pair per day.

Button Sewers (four to six buttons per garment), 250 to 450 garments per day.

Patent Buttons, overalls, 700 to 900 pair; trousers, 600 to 800 pair per day.

Blind Stitch Machine (hemming bottoms on trousers, etc), 400 to 450 pair per day.

BRIEF POINTS FOR THE NOVICE.

Corduroy cloth should not be doubled back in the usual way in laying up, but should be reversed so that the nap on both the upper and lower pieces will run the same direction. Care must also be taken in marking to have the bottom of the fore part and back part both point the same direction, otherwise the nap will run down on one and up on the other, producing a badly shaded garment. Hundreds of yards have been wasted by even good cutters in their first experience with corduroy just in this way.

Corduroy is not the only fabric possessing this peculiarity. It is noticeable on some grades of serges, cotton piece dyes, etc. Watch your fabrics.

Benzine applied to the hem of trousers will remove the gum almost immediately and release the hem.

Rubbing cloth gently with a little fine sand paper will remove glaze caused in pressing or wear. Repress.

Soap is an excellent substitute for beeswax for use on pressing irons or cloths, and of course much cheaper.

On practically all machines the top thread should be from one to two sizes larger than the bottom thread. The top thread loses about 40 per cent of its strength in passing through the tensions. The bottom does not.

In matching thread to cloth the thread should be a shade or two darker than the cloth.

To find the average yards per dozen (on table)) multiply the yards by 12 and divide by the number of sizes in the lay.

To find the average yards per dozen for the lay multiply the total yards by 12 and divide by the total number of pair.

To find the number of garments obtainable from a given number of yards, instead of dividing the amount by the average yards per dozen and then multiplying by 12, simply multiply as follows:

Where the average yards per dozen is:—

12 yards per dozen, multiply by 1.
14 yards per dozen, multiply by .86
15 yards per dozen, multiply by .80
16 yards per dozen, multiply by .75
18 yards per dozen, multiply by .67
20 yards per dozen, multiply by .60
24 yards per dozen, divide by 2.
25 yards per dozen, multiply by .48
27 yards per dozen, multiply by .44
30 yards per dozen, multiply by .40
32 yards per dozen, multiply by .37½

33 1-3 yards per dozen, multiply by .36.
34 yards per dozen, multiply by .35.
35 yards per dozen, multiply by .34
36 yards per dozen, divide by 3.
40 yards per dozen, multiply by .30.

The principle is that 12 is .80 per cent of 15, .75 per cent of 16, etc., and these percentages are as easily memorized for use as is the average yards per dozen.

The number 12 figures largely in factory work, both in calculating yardage and figuring pay rolls where the prices are based on dozens.

The ability to multiply or divide this number mentally, and quickly convert it into other numbers or fractions or decimals saves time, as is illustrated in the following table:

Where the price per dozen is:—
3 cents, divide by 4.
4 cents, divide by 3.
6 cents, divide by 2.
8 cents, subtract 1-3.
9 cents, subtract 1-4.
10 cents subtract 1-6.
14 cents, add 1-6.
15 cents, add 1-4.
16 cents, add 1-3.
18 cents, add 1-2.
20 cents, multiply by 2 and subtract 1-3.
21 cents, multiply by 2 and subtract 1-4.
24 cents, multiply by 2.

In the same manner where the prices are based per 100, and the price per 100 is:—
25 cents, divide by 4.
33 1-3 cents, divide by 3.
50 cents, divide by 2.
66 2-3 cents, substract 1-3.
75 cents, subtract 1-4.
80 cents, subtract 1-5.
90 cents, subtract 1-10.
$1.10, add 1-10.
$1.20, add 1-5.
$1.25, add 1-4.
$1.33 1-3, add 1-3.
$1.50, add 1-2.
$1.66 2-3, multiply by 2 and subtract 1-3.
$1.75, multiply by 2 and subtract 1-4.
$1.80, multiply by 2 and subtract 1-5.
$1.90, multiply by 2 and subtract 1-10.
$2.00(multiply by 2.

To find the speed at which one pulley will drive a machine or another pulley, multiply the speed (R. P. M.) of the driving shaft, by the diameter of the driving pulley and divide by the diameter of the driven pulley, or, divide the diameter of the driving pulley by the diameter of the driven pulley and multiply the speed of the shaft by the remainder.

To find the size of pulley required to drive a machine at a given speed, multiply the speed of the machine by the diameter of the pulley on the machine and divide by the speed of the driving shaft.

The circumference of a pulley is 3.16 times its diameter.

Where no tape is available for measuring long belts, the length of the belt is twice the distance between the shafts plus 1-2 the circumference of each pulley.

The slick (dressed) side of a flat belt should run against the pulley.

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